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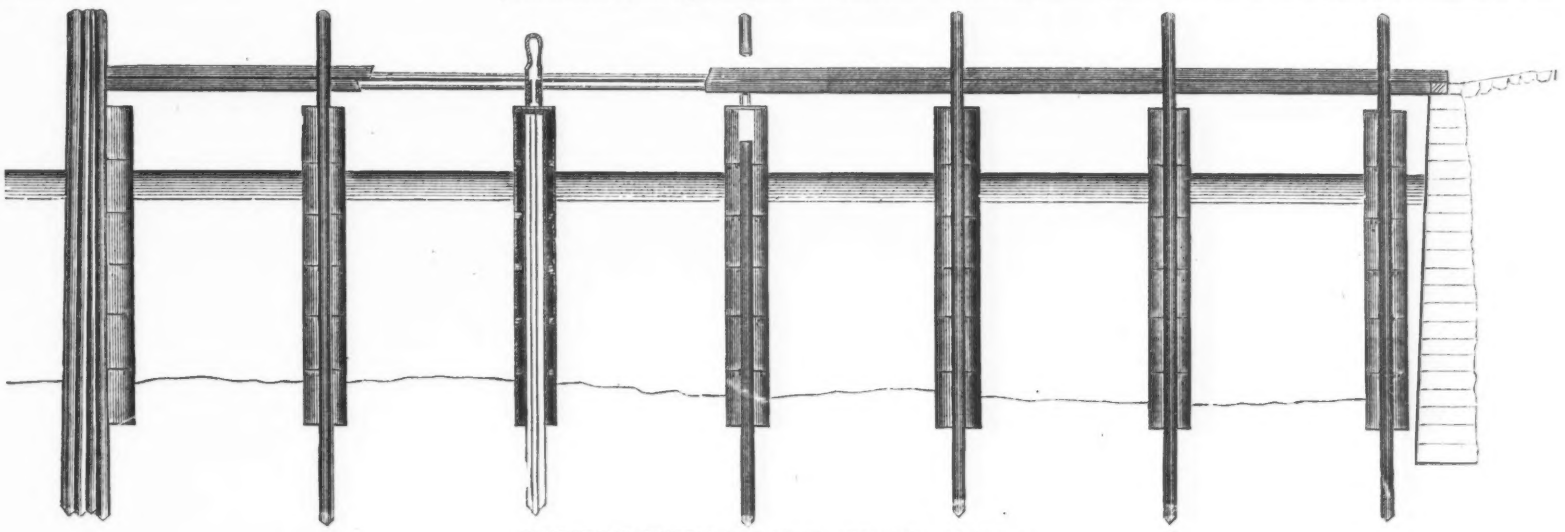
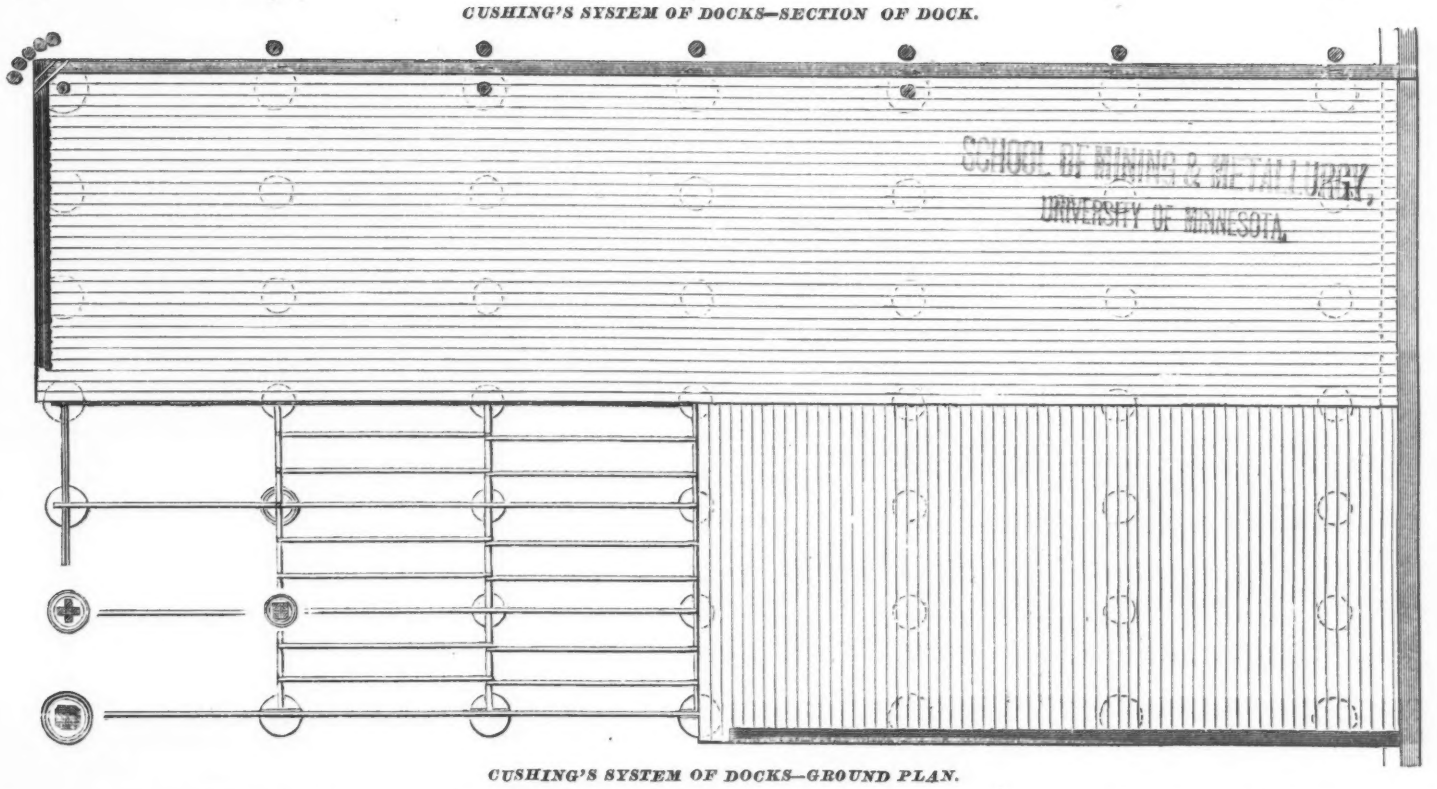
Cushing's System of Substructure for Wharves and Bridges.

For many hundred years it has been the custom among engineers to support bridges and wharves upon piles. The rapidity and cheapness with which a substructure so made could be constructed, and the certainty with which their sustaining power could be calculated, has retained that system to the present day in spite of the destruction to which the piles are subjected by the sea worm below water, and by the tendency to decay above water from the access of air, the variation of temperature, and exposure, to alternate dryness and moisture.



CUSHING'S SYSTEM OF DOCKS—SECTION OF DOCK.



CUSHING'S SYSTEM OF DOCKS—GROUND PLAN.

It is, however, universally admitted that where piles are protected, so that neither the air nor the water can come in contact with them, they are practically indestructible.

The system devised and patented by Mr. S. B. CUSHING, of Providence, R. I., completely protects the pile, while the combination or collection of the piles in clusters adds to the strength, and cheapens the cost of the structure.

The plan here shown is for a wharf sixty-five feet wide. The outer, corner columns, enclose nine piles, twelve inches square each, and the cylinders are five feet in diameter and two and one-half inches thick. The remaining outside columns enclose five piles each, of the same section, the cylinders being two inches thick. The interior columns are three feet in diameter, and enclose four piles of similar size, the thickness of the cylinders being one and a quarter inches only, as they are not subjected to much danger from collision.

The piles are carried up to within about eighteen inches of the top of the column, and when the intervening space between the columns and the piles has been filled with concrete, stone is laid on the top of the piles in such a manner as to support the flange of the upper section of the cylinders, and thereby carry the weight of the cylinder and the concrete. Resting on this stone, and also bolted to the cylinder, is a heavy cap or entablature of cast iron, the outer ones so made as to carry the string-pieces of the dock as well as the beams and stringers.

The distance between these columns in the direction of the length of the wharf is twenty feet, while across the wharf they are spaced ten feet apart. Spanning these ten feet spaces, and well secured to the caps, are girders of rolled iron of I section, fifteen inches deep, weighing two hundred pounds to the yard. Upon these girders, running lengthwise of the wharf, are beams of rolled iron of similar shaped section, nine inches deep, weighing one hundred pounds to the yard.

To these beams is secured the planking, every fourth plank being made one inch thicker and let down that distance over the beams, thus keeping the beams in place and adding to the rigidity of the structure. These planks are fastened to the beams by hook bolts, the hook passing under the bottom flange of the beam, and thus avoiding the expense and weakening attendant upon the drilling of the beams. Where the wharf is much used, it is proposed to subject the planks to some one of the processes in use for preserving wood, and cover the surface with wood pavement.

Outside of the exterior columns are driven spring piles, to prevent the sides of vessels from being injured by riding against the wharf.

At convenient distances cast-iron mooring piles are inserted in sockets made in the caps of the columns for that purpose.

The dimensions above given are based upon supporting a weight of four hundred and fifty pounds on each square foot of surface. Where buildings are constructed on the wharf, the columns are enlarged to carry any weight which may be desired.

This plan of substructure has been employed in the construction of railway bridges on the New York and New Haven Railroad, the Shore Line and the Boston and Providence Railroad. The plan of construction pursued in these cases was as follows: Piles of suitable timber, from twelve to sixteen inches square, were driven in clusters; the number and arrangement of the piles, and sectional form of the cluster varying according to the size of piles and diameter of the cylinder used.

The piles, having been driven to hard bottom, are securely bolted together, forming practically one large pile. In case hard bottom is at so great a depth that piles long enough to reach it cannot be procured, they can be pieced out. By breaking joints and properly bolting, as firm and good a cluster can be obtained as if the piles were continuous. When the cluster of piles is completed, it is enclosed in a cylinder (usually of cast iron, formed in sections) of a thickness sufficient to resist fracture by ice, the collision of vessels, or floating material which may be cast against it by the current. When lowered to the bottom, the cylinder is forced into the mud or other material in which the piles have been driven, only so far as will secure the exclusion of the water when the column is pumped out.

The space between the piling and the cylinder, is then filled with concrete, which, if properly prepared, will become, in

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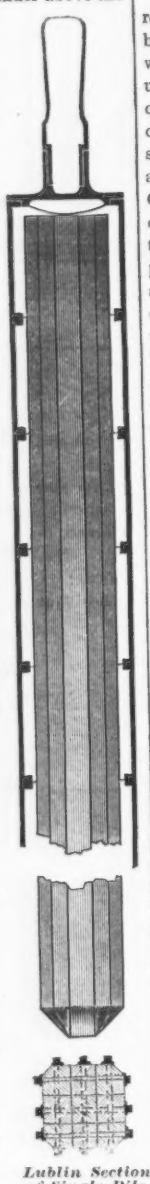
time, as hard as stone. The piles may be sawed off at the surface of the water if desired, or at any convenient point above it. The entire space thus formed within the cylinder above the piling is then filled with stone-work, composed of stones as large as can be used, having good bearing surfaces, and laid in cement. The weight upon the pier is thus equally distributed upon the piles forming the cluster.



Lublin Section of Single Pile.

The pier when completed forms a solid mass of wood, concrete and iron, combined, from the bottom of the river to the top course of nicely fitted masonry beneath the upper flange of the top section. The air being entirely excluded from the timber piles by the concrete, they must be almost imperishable. Any number of columns may be combined to form a pier.

At India Point Bridge, in the Boston and Providence Railroad, constructed upon this system, there are, exclusive of one stone pier, two piers of two columns each, and one draw-pier formed of a circular group of columns with one central column ; all but the stone pier are in deep water, and a very rapid tide-way. The two-column piers are each capped and braced with timber ; the draw-pier having a heavy timber traversing platform covering the group. The deepest water at either pier was thirty-one feet at high tide, and the piling for all the piers was driven about twenty-five feet into the bottom.

At the Shore Line Railroad Bridge, Connecticut river cross-ing, there are four piers composed of two columns each ; one of four columns, and one, the pivot-pier of the draw, of eleven—a central column eight feet in diameter surrounded by four of six feet diameter, and six of five feet diameter. These piers are in water from twenty-two to forty-five feet in depth, running, in times of freshet, full six miles an hour. They have been subjected to very severe tests, which they have successfully withstood.

The great durability of good cast-iron, even when exposed to the action of salt water, has been so clearly established by experience, that its use in the construction of cylinder piers has become quite general within the last fifteen or twenty years.

They should be well painted with red lead before being put down, or the iron can be saturated with linseed oil forced into the pores while hot under pressure. For all ordinary cases, paint, however, will answer all purposes. Additional information may be obtained by addressing the inventor, S. B. CUSHING, at Providence, R. I., or by applying to THEODORE ALLEN, 45 William street, New York.

The Goderich Salt Region.

By T. STERRY HUNT, LL. D., F. R. S.

IT is a curious fact that the numerous and productive salt wells of Saracuse, New York, although occurring upon the outcrop of the Onondaga formation, do not penetrate into it, but are sunk in a deposit of stratified sand and gravel, which fills up a valley of erosion on the shores of Onondaga lake. The limits of this valley are nearly four miles from north to south, by two miles from east to west. The shales belonging to the base of the formation crop out to the northward, and are found in the various borings beneath the ancient gravel deposit, which is itself covered by thirty or forty feet of a more recent deposit of loam or sand. The bottom of the basin is very irregular, the shales being met with at depths of from 90 to 180 feet in some parts, and at 382 feet in the middle of the valley. According to Mr. GEDDES, the greatest depth of this ancient basin is not less than 414 feet below the surface-level of Onondaga lake, and 50 feet below the sea level.—(Trans. N. Y. State Agricultural Society, 1859.)

Beds of the ancient gravel are occasionally found converted into a hard concrete, the cementing material of which, in some cases at least, is crystalline laminated gypsum. The wells are bored in this gravel to various depths up to 350 feet ; brine is met with at about 100 feet, but the brines of the deeper wells are stronger, and less liable to variations in quality with the season of the year.

The report of the superintendent of the Onondaga salt springs, for 1868, contains some interesting details of wells sunk in this region during the preceding year. One of these, at a distance of two or three hundred yards from the wells which supply with brine the Liverpool district, was found to be outside of the gravel basin, the green shales of the Onondaga formation having been encountered at a depth of 82 feet, beneath which the strata, to a depth of 715 feet from the surface, consisted of green, red, and gray shales, with a few beds of bituminous limestone, and a little gypsum, green shales forming the base. Fresh water was met with at 116 feet, and salt water first appeared at 164 feet. Analysis of the saline waters, from 291 and 540 feet, are given by Dr. GOESSMANN. That from the latter depth contained in 100 parts, chloride of sodium, 4.5478 ; chloride of calcium, 5 8658 ; chloride of magnesium, 2.0237 ; sulphate of lime, 0.1070=12.5433. The water from the higher level contained nearly the same proportions of elements, but was less strong. The water from a well 148 feet deep in the shales, four miles farther west, was very similar in composition to that of which the analysis has just been given, and the same is true of two wells sunk in 1867 at Canastota, about twenty miles to the eastward of Syracuse.

In one of these, after penetrating through about 300 feet of red and blue clays, a cemented gravel was met with, followed by loose gravel and sand to a depth of not less than 648 feet, where a hard rock was encountered, and the boring discontinued. The water from these wells was a strong but bitter brine containing in 100 parts, sulphate of lime, 0.0058 ; chloride of calcium, 4.8200 ; chloride of magnesium, 0.2281 ; chloride of sodium, 15.2288, and carbonate of iron, 0.0150. For this analysis and description of the well I am indebted to Dr. C. A. GOESSMANN. Here, then, as at Syracuse, the brine occurs in a deep excavation in the Onondaga formation. The shales of this region, as long since pointed out by EATON, show, in many parts, peculiar hopper-shaped markings, which are recognized as the casts of crystals of chloride of sodium, and hence it was conjectured that the source of the brines was to be found in these strata ; although it was not impossible that they might be derived from more recent deposits of rock-salt occupying the remarkable gravel-filled basins which are shown to exist at Syracuse and Canastota. The discovery, in Ontario, of rock-salt in solid masses interstratified with the base of the Onondaga formation, leaves, however, but little doubt of the correctness of the views long maintained by the New York geologists, that the source of the brine is to be found in this formation. Borings like those of Goderich will probably one day show the existence in the vicinity of Syracuse of similar beds of rock-salt, which now yield to the action of infiltrating waters the brines that accumulate in the gravel beds occupying the reservoirs just described. These also receive the bitter waters which are derived from the shales of the same formation, and contaminate the brines of Syracuse ; although they do not mingle to any injurious extent with the water from the borings of Goderich and its vicinity.

In this connection it may be mentioned that brine has been obtained at Port Austin, Huron county, Michigan, on the opposite side of the lake and a little north of west from Goderich. The surface rock of this region is a sandstone of the Chemung formation, beneath which, at a depth of 1198 feet from the surface, there was extracted a brine of which a specimen furnished to Dr. GOESSMANN marked 88° of the salometer, and gave for 100 parts, chloride of sodium, 17.6161 ; chloride of calcium, 3.1274 ; chloride of magnesium, 1.5675, and sulphate of lime, 0.0129=22.3239.

ANALYSES OF THE BRINES OF GODERICH AND ITS VICINITY.

In the Report for 1866, a first analysis was given of the brine extracted from the well of the Goderich Company, the first one bored at Goderich, and at that time not yet pumped in a continuous or regular mannerr Since that time the well has furnished an uninterrupted supply of salt water, and has yielded, for the greater part of the time, 100 bushels of salt daily. It becomes therefore an interesting inquiry whether, during this period of more than two years, the composition of the brine has undergone any change, and to this end we may compare four analyses made from brines taken at the dates given below, the analysis II. being by Dr. GOESSMANN, the others by myself :—

I. August 19, 1866 ; cited from Report for 1866, page 269.
II. April 1867 ; from a Report by Dr. GOESSMANN.
III. February 1868 ; brine sent me by the proprietors of the well.
IV. November 5, 1868 ; brine collected by me at the well.

	I.	II.	III.	IV.
Chloride of sodium	259.600	241.433	undet.	236.410
" " calcium	.432	.216	.182	.190
" " magnesium	.254	.336	.288	.410
Sulphate of lime	1.882	5.433	5.679	4.848
	269.568	247.418	.....	241.868
Specific gravity	1.205	1.195	1 192	1.187
Degrees of the salometer	100°	95°	94°	92°

The cause of these variations is to be found in the fact that the sources of saline matters in these brines are three-fold : 1st. The solution of nearly pure rock-salt ; 2nd. The solution of beds of gypsum or sulphate of lime, which lie in the shales above the salt ; and 3rd. The intermixture of bitter waters, containing large proportions of chlorides of calcium and magnesium. Such waters occur in the strata both above and below the salt deposit, and become mingled with the fresh waters which flow in to supply the void caused by pumping. The composition of these bitter waters is very variable ; in some the chloride of calcium and in others the chloride of magnesium predominates. The waters of this class are noticed in connection with salt-making in the report just cited, page 271, and analyses are given on pages 272, 273 and 276. The analysis of a similar water from Syracuse is given in the present report on page 219. The quantity of bitter salts in the Goderich brines, however, is insignificant when compared with those of most other salt producing regions. It is to be noticed that at the time of the first analysis, the well was not regularly pumped, and that the brine, though saturated, contained less gypsum and more chloride of calcium than it has since yielded ; while the chloride of magnesium has somewhat increased in quantity. The density of the brine is subject to some little variation, but is said in the Goderich Company's well rarely to fall below 92°, and after a repose of a few hours to rise considerably above it. Of the other wells which have been sunk at Goderich, four were being pumped at the time of my last visit, in November, 1868, and from these I took specimens of brine. It was not considered necessary to analyse these brines from adjacent wells of the same depth, but their specific gravity at 62° Fahrenheit was determined, and is here given, with the corresponding degree of the salometer :—

Goderich Company's well,	density	1.187	equal	92°	salometer.
Dominion well,	"	1.175	"	87°	"
Huron well,	"	1.176	"	87°	"
Ontario well,	"	1.160	"	81°	"
Victoria well,	"	1.160	"	81°	"

The brines of Clinton and Kincardine show a strength and purity comparable to those of Goderich. Of the following analyses, V is that of the brine from the Clinton well, collected by me on the 6th of November, 1868, and VI is that from Kincardine, sent to me by the proprietor a few days later, the well not having been in operation at the time of my visit to the district :—

	V.	VI.
Chloride of sodium	204.070	241.350
" " calcium	.470	.840
" " magnesium	.184	.230
Sulphate of lime	5.583	3.264
	210.307	245.484
Specific gravity	1.157	1.191
Salometer	80°	94°

Survey of the Nicaragua Route for a Ship Canal.

BY COL. O. W. CHILDS, C. E.

From the Journal of the American Institute.

To the President and Directors of the American and Atlantic and Pacific Ship Canal Company.

GENTLEMEN : Having accepted the appointment of Chief Engineer of your Company, to make a survey and location of a line for the construction of a Ship Canal from the Atlantic, at the harbor of San Juan del Norte, in the State of Nicaragua, to the Pacific Ocean, I, in pursuance of instructions subsequently received, organized an Engineer Corps in the city of New York, and proceeded to San Juan del Norte ; thence up the river San Juan, and across the Nicaragua Lake to the city of Rivas de Nicaragua, at which place we arrived on the 27th day of August, 1850.

In relation to the general plan of conducting the survey, the further instructions of your Board is as follows: "The company being informed that there is a practicable route for a ship canal from the Lake of Nicaragua to Salinas Bay (on the Pacific), it is desirable that *this line should be first* examined, and if believed to be practicable, surveyed, and if it be a feasible line, no survey from Lake Managua (or Leon) may be required, as the object of the company is to *save expense* by saving distance. If, however, this line cannot be adopted without tunnelling, or very deep and long *continued excavation*, you will then preserve your notes (of course), to make and transmit to us an estimate of the cost of the work on this line, and proceed at once to make the survey from Lake Managua to the Pacific, and to such points thereon, *where there is a good harbor*, or such points as in your judgment may be advisable, and continue this until the most practicable route shall be found. You will then ascertain the line through the lake to the river Tipitapa (or Panaloya), the depth of water, etc.

"After reaching this river, you will, by survey, ascertain the best line to Lake Nicaragua, and whether any part of the river can be used at *less expense* than by canalling the entire distance between the lakes. This done, ascertain the line through Lake Nicaragua to the river San Juan, and thence the depth of water at the *lowest* and *highest* stages down to the rapids of Castillo Viejo. From the last point to San Juan de Nicaragua ; ascertain the capacity of the river obstructions, and possibility of their removal, etc. A line, without reference to the river, should also be run from San Juan de Nicaragua to the rapids of Castillo Viejo.

"The harbors we wish to have particularly examined.

"In the above instructions, the company do not wish to limit you in your examinations ; they wish the most feasible line that exists for the construction of the canal, from ocean to ocean, *surveyed* and *located*, and if these cannot be done in the mode pointed out, *do them in any other*.

"The estimates and surveys we wish to be for a canal of sufficient depth of water for vessels of the largest class, and to combine the greatest cheapness with the greatest durability. To accomplish these, we do not think it necessary to make the canal of a uniform width, but to have it wider in some places, for 'turn-outs,' than in others. The locks must be faced with wood (or timber) to preserve ships from injury.

"We wish no ornamental work, and no estimate for anything not essential to durability and usefulness."

In constructing these instructions, their application to any other line leading from the Nicaragua lake to the Pacific, more direct, and in its other general features more advantageous for the construction and use of a ship canal, than either of those specified, was deemed to be in compliance with their provisions, and although a line so favorable as strictly to fall within the terms of the resolution may not have been found, yet if that selected for survey and location is shorter, less expensive to construct, more convenient and practicable for use than any other upon which a connection of the Lake of Nicaragua with the Pacific ocean might be formed, the omission of other reconnoissances and the survey of other lines will not, as is believed, be deemed in violation of the spirit of the instructions.

The Lake of Nicaragua, in the direction of its greatest length, lies nearly northwest and southeast. It has an extreme length and width of about 110 by 35 miles.

Its greatest proximity to the Atlantic is near its southerly end, from which, upon a right line, it is about sixty miles distant. The point of its nearest approach to the Pacific is near the middle of its length, where, by the shortest line, the distance across is about 11 miles.

The only outlet of this lake is the San Juan river, which has its issue near the southerly extremity of the lake, at Fort San Carlos, in latitude 11° 1′ 23″, and, after pursuing generally an easterly and a sinuous course a distance of about 119 miles—receiving considerable accessions from the Rio San Carlos, the Serapiqua, and several others of less magnitude, and again losing much the largest portion of its waters through the Colorado, (a diverging branch connecting with the sea at a more southerly point,)—it enters the Atlantic through the harbor of San Juan, in latitude 10° 56′ 45″ north and 83° 42′ 19″ west longitude,

About from 15 to 18 miles northwesterly from the Lake of Nicaragua, is the Lake of Managua, having a length variously

estimated at from 30 to 45 miles, and an average of 12 or 15 miles in breadth. The only known outlet of this lake is into that of Nicaragua.

Proceeding northwesterly from Costa Rica, a State adjoining Nicaragua on the south, the range of high lands, which at some points rise into lofty mountains in the former State, becomes less elevated and broken, and, on approaching the State of Nicaragua, the general surface falls away into hills comparatively of moderate acclivity and elevation, being in most cases susceptible of cultivation to their summits. This latter description is more especially applicable to that section of country lying between the Lake of Nicaragua and the Pacific, to an extent of over two-thirds the length of the lake. On this distance, and between these two bodies of water, are several transversal valleys extending quite across, with summits varying in height, and furnishing, generally, good opportunities for direct communications be means of ordinary roads, and, in a single instance, what is deemed to be a practicable route for opening a communication by canal. Continuing northwesterly, the hills soon again assume the form of low though continuous mountain ranges, extending along the coast of the Pacific nearly 100 miles, to where they branch off, in some cases into isolated ranges, partaking more the form of diversified hills, which diminish in elevation and gradually subside to the more level lands forming the valley extended from the Lake of Managua to the coast of the Pacific at the port of Realéjo, in about 12° 28′ north latitude.

The elevated lands extending southeasterly from the Gulf of Fonseca, in latitude 12° 50′ north, along the the easterly side of the Lakes of Nicaragua and Managua, appear to decline to a lower general level near the southerly termination of the latter lake, and occupy a broad belt of the country between the lakes and the Atlantic, from which divergent branches, in some cases of apparently continuous, and in others of isolated, low ranges of hills, terminate at points remote from each other, and in some instances abruptly on approaching the San Juan river.

From the brief topographical description thus given, it will be perceived that the Lakes of Managua and Nicaragua occupy a considerable portion of a great valley extending from the Pacific at the Gulf of Fonseca and the port of Realéjo, southeasterly to a few miles beyond the southerly end of the latter lake, from which, with a general direction more easterly, and embracing within its limits the river San Juan, it continues, with a much contracted width, and with material exceptions to well defined boundaries, to the Atlantic Ocean.

In addition to the ranges of hills before described as terminating on the northerly side of the river, are those bounding the lateral valleys through which flow the rivers San Carlos and Serapaqui, two considerable streams having their origin south, in the high lands of Costa Rica, and flowing northerly, are, as before stated, received into the San Juan ; the former 65 21-100, and the latter 90 25-100 miles from the lake. The valley, on its southerly side, is further intersected by hills lying transversely, and approaching the river at the rapids of Toro, Castillo, Machuca, and at various other points on either side the river, washes the bases of shorter ranges, and in some instances of isolated conical hills.

From observations, and information derived from other sources, it appeared evident that the construction of a ship canal from the Atlantic to the Pacific Oceans, in the State of Nicaragua, could not be considered practicable upon any route other than that through the valley of the San Juan river to the Lake of Nicaragua, and from that lake either southwesterly upon a line through some valley extending across the dividing ridge, or northwesterly up the Rio Tipitapa to the lake of Managua, thence through the valley extending from the head of that lake to some feasible point for a connection with the Pacific. In view of the much greater length of canal that would be necessary on this latter route, and the greater amount of lockage required, as the lake of Managua was supposed to be near thirty feet higher than that of Nicaragua, and more especially the greater expense and uncertainty of obtaining a full supply of water for that more elevated summit, it was deemed important at least so far to explore the country between the westerly side of the lake and the Pacific, as would be necessary to determine whether a practicable route existed upon which the canal might be constructed directly across to some feasible point for a connection with the Pacific.

With these general impressions, and in pursuance of the special instructions, a reconnoissance was first made of that part of the country lying in the department of Guanacaste, between the lake at the mouth of the Sapoa river and the Pacific at Salinas Bay. The valley thus examined lies the most southerly of any offering the remotest prospects of affording a practical line for a canal. The Sapoa river rises at the head of a valley extending south from the southwesterly side of the lake far into the interior, having the high lands skirting the Pacific south from Salinas Bay, on the west, and the Costa Rica mountains, a continuous and much elevated range, on the east.

A much inclined valley, about one and a half miles in width, extends back from the head of the bay about three miles, and terminates at the base of a precipitous surface, extending up to the verge of table lands elevated about 1000 feet above the bay. From this eminence, the general surface, with much uniformity, descends in an easterly direction, forming the eastern slope of an improved portion of the broad valley of the Sapoa river. A line of level was commenced at the surface of Salinas Bay, at low tide, and carried back over a surface ascending uniformly to an elevation of 200 feet, in a distance of 2¾ miles to the northeast corner of the valley, thence bearing to the left, the level was extended northeasterly up an irregular narrow ravine, bounded by high projecting spurs, a further distance of 0 66-100 mile to the summit, having an elevation of 534 feet above the bay. This summit has a length of about four chains, and a width only about equal to that required for a canal, and is bounded on either side by precipitous surfaces, extending up some 4 or 500 feet to the general level of the table lands, before alluded to. Proceeding from the summit easterly down the opposite plane, in the direction of the lake, the level was extended about five miles, to within a few chains of the Sapoa river at a point 432 feet above low tide in the bay, and to which, by means of a low dam and short embankment, the waters of the Sapoa might be readily conveyed and conducted thence to the summit level of the canal. By establishing the summit level at this elevation a cut would be required 119 feet in extreme depth, the surface gradually falling down to the bottom plane of the canal on the Pacific side, in a distance of fifteen chains, and on the opposite or lake side, in about 4½ miles ; an ascending lockage from the lake of 320·53 feet, and 432 descending lockage to the Pacific would be necessary to pass this summit. A permanent supply of about 4,000 cubic feet of water per minute would be furnished by the Sapoa river, and any additional quantity that might be required for the use of the canal, could be made available by reservoirs constructed on sites unusually favorable for that purpose.

From the junction of the line with the Sapoa river to the lake, a distance of about fourteen miles, no instrumental examinations were made. From observation, however, and information obtained from other sources, the opinion is entertained, and at least ordinary facilities exist along the valley of the Sapoa for the construction of a canal, especially when considered in connection with that part of the line which would occupy the broad and sufficiently deep channel of the river, a distance extending back inland from the bar in the lake, about four miles.

Among the most unfavorable features connected with the construction of the canal upon this line, is the magnitude of the cut required through the summit, the expense of which would be enhanced by the long haul necessary in depositing the material, the large amount of lockage required, the great expense of introducing to the summit a full supply of water, the expense of constructing and the disadvantages in use of that part of the line extending from the summit west, arising from the many sinuosities, the rugged borders and rapid descent of the ravine—the latter involving the necessity of combinations of locks ; also the long cut (nearly ¾ of a mile in rock) that would be required from the margin of the bay of Salinas to deep water. The unfavorable features in the ravine descending west are such as scarcely render this a practicable route.

Another transversal valley, about 3½ miles westerly from Rivas de Nicaragua, with an apparently low summit, was examined by running a line of level from the surface of the lake east of Rivas, westerly upon the most direct route, over an inclined though moderately undulating plain, ascending 326 feet in a distance of 6½ miles, to the summit of a broad valley, passing between the hills (which are here of moderate height) and connecting with another valley on the west side, which, by a very direct line, extends to the Pacific at the harbor of Brito. The quantity of water available for the summit being entirely inadequate, and the cut altogether too formidable on the plan of carrying the lake level through to the western slope, this route was abandoned, and the level was extended about 3½ miles north to another depression in the ridge, elevated 198 feet above the surface of the lake.

Proceeding from the lake west upon a line passing the ridge at this point, the surface, with much uniformity, rises 60 feet in the first distance of about 4½ miles, 34 feet in the next 1⅝ miles, 50 feet in the succeeding 81 chains, thence to the culminating point in this pass, a further rise of 54 feet occurs in 30 chains, making a total rise of 198 feet in the aggregate distance of 7 26-100 miles. Continuing the level from the summit west, the surface was found to descend 130 feet in 86 chains, and to fall to the level of the lake in a further distance of 30 chains or 1 36-80 miles from the summit, thus showing that a thorough cut of 198 feet in extreme depth, and 8 71-100 miles in length, exclusive of the additional depth necessary for the canal, would be required on the plan of carrying the lake level through to the western slope of the ridge, forming the eastern boundary of the Chocalape valley, which, uniting first with the valley of Rio Tolo, then with that of the Rio Grande, also reaches the Pacific at the harbor of Brito in a distance of about 11 19-80 miles, making the whole distance from the lake to the Pacific, by this route, about 20 miles.

Proceeding northerly from the line above alluded to, the lines of the coast of the Pacific and of the lake severally diverge, giving a corresponding increase to the width of the territory between them; the moderately inclined and fertile plain skirting the western border of the lake nearly its entire length, assumes more expansive limits, while the hills bounding the Pacific appear continuous and of greater elevation, thus presenting obstacles regarded as too formidable to justify further explorations of the country extending from the line last described to the north end of the lake.

The line of level was next carried to the summit of a transversal valley, lying about 6½ miles south of Rivas de Nicaragua, between the Rio Lajos, emptying its waters into the lake about 1½ miles north of Virgin Bay, and the Rio Grande which flows into the Pacific at Brito Harbor. This summit was found to be 47½ feet above the surface of the lake, as it stood on the twenty-third day of December, 1850, at which time it was 3·43 feet above its lowest stages, or that to which it subsided in April last, and 1 57-100 feet below the elevation at which it ordinarily stands during the latter part of the wet seasons.

From a general view of the country through which the line upon this route would pass, it appeared evident that but little rock excavation would be encountered west of the western termination of the summit level, that the surface would generally be favorable, and as was represented the length of the line would not exceed 20 miles.

The following information in relation to the route extending from the northerly end of the Lake of Nicaragua through the Lake of Managua, thence to the harbor of Realejo, is furnished by the report of the surveys made in 1837 and 1838, under the patronage of the government of Central America, by Mr. John Bailey, an English engineer, and from other sources, as published in the United States Congressional Document entitled "Rep. No. 145," by Hon. John A. Rockwell, from the select committee, &c., under date of February 20, 1849. From this document it appears, (see page 597,) that "the Lake of Managua," here called "Leon," "is 28 feet 8 inches above the level of that of Nicaragua," and that "the most elevated point of land between the Lake Leon and Realejo is 55 feet 6 inches above the level of the lake;" and on pages 604 and 605 it is stated that "up to the present time, the general opinion of competent persons who have devoted their attention to the junction of the two seas through the State of Nicaragua, is that the canalization of the rivers San Juan and Tipitapa offers no extraordinary difficulty. The only important point to ascertain was the elevation of the land between the Lake of Leon and the Pacific. We have seen that the engineers agree in representing this elevation as not being considerable. Dampier, Stephens, Rouhand and Bailey contend that the country gradually declines to the ocean; according to other informants the highest ground is 49½ feet above the Lake of Leon, but Mr. A. G****, who explored the country in 1842, has accurately investigated its formation, and has furnished us with the following particulars :

The western coast of the Lake of Leon is 26 feet above the lake ; from thence the land rises gradually for a distance of 2,725 yards (or 1 55-100 miles) to an elevation of 55 feet 6 inches ; here is then the culminating point whence the ground gently descends to the ocean.

"At a distance of eleven miles from the western shore of the lake, on the line which the canal should take to join Realejo, we find the River Tosta," (presumed to refer to the River Tolita,) "which at this spot is 34 feet above the lake."

The distance from this river to where the plain of the ground surface falls down to the level of the lake is not given in the report. Admitting, however, as an approximation, that the inclination from the river, in the direction of Realejo, is the same as that from the summit to the river, then the ground surface would meet the level of the plain of the surface of the lake if extended 14 94-100 miles beyond the River Tosta, or 24 39-100 miles west from the summit. The distance from the lake to the summit being given at 1 55-100 miles, it appears probable that with the addition of the requisite depth for the canal, the length of deep cutting on this superior level would be at least 25 94-100 miles ; that its extreme depth would be as before stated, 55½ feet exclusive of that required for the canal.

In relation to the River Tipitapa, the following is found on page 603 of the report above alluded to : "The Lake of Nicaragua," says Mr. Bailey, "is connected with that of Leon by means of the River Panaloya, (or Tipitapa,) navigable for the boats employed in that country for twelve miles, as far as the place called Pasquiel, where the inhabitants go to cut and bring away Brazilian timber. The four miles which remain between that place and the Lake of Leon are not navigable for any kind of boat, whatever be its construction, because beyond Pasquiel the channel is obstructed by a vein of rocks, which, when the river is swollen, are covered with water, but in the dry season the water sinks so low that it can only escape through gradually diminishing fissures in the rocks. At a distance of a mile beyond this first vein of rocks, we find another more solid, which, crossing the river at right angles, forms a cascade of 13 feet descent. The River Tipitapa, which discharges into the Lake of Nicaragua, is the only outlet for the Lake of Leon."

On the 15th of April last, without the use of instruments, I examined with care that portion of the River Tipitapa extending from the Lake of Managua to the place Pasquiel, referred to by Mr. Bailey as the "depot of Brazilian timber." This point, as nearly as could be estimated, is about 5 miles from the lake, and below all the rapids that occur in the river. It being near the close of the dry season the lake was supposed to be about at its lowest stage, and was found depressed several feet (say from 4 to 6) below the crest of the first fall, which occurs in the bed of the channel of the outlet, about one mile from the lake; consequently no water, at the time of the examination, passed this point.

The channel, as far down as examined, has a width of say from three to four hundred feet, with banks of regular form from six to ten, and in some instances of a greater height. Proceeding down or southerly from the point of maximum elevation in the bed of the outlet, a descent of one or two feet occurs in a distance of half a mile. Here it has a vertical fall of from twelve to fifteen feet ; thence a fall about the same in the aggregate occurs in the succeeding distance of about three and a half miles to Pasquiel, by which is formed a succession of rapids with short intervening levels, containing pools of water, formed by springs issuing at the margin, and at other places through fissures in the rock.

From Pasquiel to the Lake of Nicaragua, a distance variously estimated at from twelve to fifteen miles, the water in the outlet is probably upon the same level as that of the lake, its channel appears a little wider than above Pasquiel, and is said to be navigable with boats drawing two to three feet water ; portions of the distance have, probably, a greater depth. It passes through a small lake with shoal water lying near the northerly end of Lake Nicaragua. The excavation upon that portion between the Lake of Managua and Pasquiel would be almost entirely in rock ; the country being quite level between Pasquiel and Lake Nicaragua, and a portion of it sufficiently elevated, a part of the distance would be favorable for the construction of a canal ; the remainder would probably be expensive.

From the extract before given of the remarks of Mr. Bailey

in relation to the flow of water in this outlet, it appears that the Managua Lake must have stood at a greater elevation when examined by him, or the elevation adopted for the lake, and with which the height of the summit north of that lake was compared, was greater than that at which it stood when examined in April last. If this view be correct, then it would seem inevitable that either the restoring to and maintaining the surface of the lake at an elevation equal to that of the crest of the first fall in the outlet would be necessary, or that an addition to the depth of cutting, equal in amount to the depression of the lake surface below the crest of said fall, say from 4 to 6 feet, must be made from the summit connected with and extending north from the lake. The former might not be practicable, and the latter would evidently be attended with much additional expense.

By a recapitulation of some of the principal elements of cost before given, and which would be encountered by the construction of the canal upon this route, between Nicaragua Lake and the Pacific, it would appear probable that the canal between the lakes of Nicaragua and Managua would have a length of about 20 miles, that it would be constructed independent of advantages derived from the adoption for the line of any portion of the River Tipitapa, and that an ascending lockage of 28½ feet would be required to reach the latter lake, admitting it to be maintained at the same elevation that it had when examined by Mr. Bailey; and from the Lake of Managua in the direction of the Pacific, the lake or summit level would occupy about 26 miles, upon which an extreme depth of 55½ feet of cutting would be required, and if the bottom plane of this thorough cut should be lowered, as would probably be necessary, at least sufficient to correspond with the depressed surface of the lake, then an amount equal to this depression below the culminating point of the bed of the outlet would, necessarily, be added to the depth of cutting upon the entire length of this level.

Thus showing that, upon this route, the construction of over forty-six miles of canal would be necessary to open the communication between Lake Nicaragua and the Pacific, there would be, independent of that portion of the distance occupied by the Lake of Managua, a summit level twenty-six miles in length, with an extreme depth of over fifty-five feet of cutting, exclusive of the contingent additional depth before mentioned, and that required for the depth of water in the canal; and it would involve an excess of fifty-seven feet of ascending and descending lockage beyond that which would be required on the plan of making the Lake of Nicaragua the summit level of the canal.

Having, from personal examinations, formed the opinion that the general features of the country, affecting the feasibility of constructing the canal between the Lakes of Nicaragua and Managua, were no more favorable than had been represented, there appeared to be no good reasons for regarding existing facilities for the construction of that beyond the Lake of Managua, not examined by the undersigned, with more favor than representations from the same sources seemed to justify.—

[TO BE CONTINUED.]

MINING SUMMARY.

Colorado.

MINING AT MONTEZUMA.

A correspondent of the Georgetown *Miner*, writes of the mines in and around Montezuma. We condense from his lengthy remarks the following particulars: "First in order is the Comstock, of the Boston Mining Association. This mine is situated on the southwestern face of Glacier mountain, at an estimated altitude of nearly 12,000 feet above the ocean level. Following a toilsome trail, we reached and entered the lower tunnel of the mine. This tunnel is 150 feet long, from which a level extends 425 feet. We saw masses of ore ready for the hands of the stopers along nearly the entire length of this level. A shaft, or winze, 70 feet deep, connects this level with the lower one, which is 200 feet long, in which we examined the same massive vein loaded with ore. Ascending to the level again, we climbed into a 'stope,' and observed a large body of ground, in which the miners had been busy extracting the abundant ore. A winze of 70 feet also connects the lower and upper tunnels, and in the works of the latter the ore occurred in wide strata. The vein of the Comstock stands nearly perpendicular, and varies in size. At one point it spread out to eight feet, and at another it contracted to a few feet; but it preserved a general width of four to five feet. At the point of greatest width there was a stratum of compact ore two feet thick upon the head-wall: the same upon the foot-wall; while ore was disseminated through the intervening mass of feldspathic gangue. In the different works disclosing the vein, the solid ore ranged from four inches to two feet thick, and I should judge it fairly averaged eighteen inches. The galena was massive, and formed, perhaps, one-third of the ore. Zinc blende and iron and copper pyrites occur also abundantly; and in the deepest works silver glance and brittle silver are not uncommon. Handsome crystals of heavy spar are of frequent occurrence. Tests of the value of the different kinds of ore ranged from $40 to $100 per ton. All the work in the mine—the spacious, clean-cut tunnels and levels, and the well-timbered winzes and stopes—indicated the most skillful management. Captain WARE informed us that it was part of his project to open the mine by a tunnel of 450 feet below the present lowest tunnel, which will be 550 feet long, and will cut the vein nearly 700 feet from the surface. If this plan is carried out, it will open avenues to bodies of ore that will require years to extract. The amount of ore ready for reduction and piled at the mouth of the tunnel, in the ore-house near by, and at the mill, was estimated at 3,000 tons. And if occasion should require it, Captain WARE told us he could easily set fifty men to stoping ore. The ore will be delivered from the mine to the mill over a tramway about 2,200 feet long. This tramway, which was building under the direction of Captain WARE, will connect with the present lowest tunnel, and ultimately with the projected deep tunnel. Not only ore, but the miners, and all supplies for the mine, will be carried over the tramway. It will be capable of discharging 100 tons of ore from the mine to the mill daily.

"The reduction works of the company are of a very inferior character, unworthy of the splendid mine, and wholly inadequate to the treatment of the ore. They consist of a crusher and rollers; a small concentrator, and a reverberatory and a cupola furnace. Down the gulch, about a quarter of a mile, also in Glacier mountain, is the mine of the Chenango Company. A tunnel, of 490 feet long, pierces the side of the mountain about 300 feet above the bed of the gulch and 350 feet below the surface of the mountain. The vein is evidently of great size, but its dimensions have not been determined by the partial exploration. In the course of the tunnel several strata of ore were observed, and in a short drift a good body of tolerably compact ore between two and three feet thick was noticed. Some ten tons of ore were lying near the mouth of the tunnel, tests of which showed it to be worth about $120 per ton. A short distance below the mine the company has a sort of mill lying idle, and, it is to be hoped, abandoned to the bats. The mine of the company is unquestionably of great value. It is superintended by an active, clever miner, named MICHAEL DOWD. Passing down the broad gulch into Montezuma park, we visited the ground of the St. Lawrence Company. Its reduction works are in course of construction, and will be completed this fall. I did not learn their contemplated character or extent. The mines of the company in the neighborhood—the Silver Wing and the Napoleon—are situated on the northern face of the Glacier mountain, a few hundred feet above the south fork of the Snake. Both mines are opened by tunnels, respectively 40 and 80 feet long, and both disclose good bodies of ore, in which the silver is borne chiefly by galena and blende. The ore from the Silver Wing might be pronounced unusually base, while that from the Napoleon appeared to be generally of a fine quality. There can be no reasonable doubt that capital, skill, and labor would convert both mines into tangible and remunerative property. Near at hand are the mill and mine of the Sukey Silver Mining Company, under the management of Mr. JOHN T. LYNCH. The mill of the company is small—a mere 'sample' of a mill—and is palpably the nucleus of larger and more complete works. The mill consists of a battery of five stamps, one reverberatory furnace, and two pans. The motive power is water. The mill was an experiment, in which economy and efficiency would appear not to have been taken into account. But I hope it is only the mistaken beginning of a good end. The Sukey mine lies on the mountain a short distance above and beyond the mines of the St. Lawrence Company. It has been opened by two tunnels—one of which is 225 feet long, and the other 100—and a shaft about 40 feet deep. The vein is between four and five feet thick, and shows a body of ore exceeding two feet. The ore exhibits very rich specimens, but the great bulk of it is of a low grade, the average point being between $35 and $40 per ton. There would appear to be no limit to the capacity of the Sukey for the production of this grade of ore. The question is, will this quality of ore pay? I answer in the affirmative without hesitation. It can be easily shown that this grade of ore may be worked with profit in a well-appointed mill furnished with a Stetefeldt furnace, say of the capacity of thirty tons. For example: put the average chlorination at 90 per cent., (and this figure is below the demonstrated results of that furnace), and $40 ore would yield $36 in silver per ton. Of these $36 allow the liberal sum of $15 for the entire expense of reduction by the Stetefeldt process; the large sum of $10 for mining and delivering the ore at the mill; and there are remaining $11 as profit."

MILLS REFITTING.

According to the Central City *Register* all the old mills in Nevada are being fitted up anew. LEWIS & TABOR are running on California ore. They have gone to considerable expense in fitting up their mill, and are now doing as good work and making as close returns as any mill in the gulch. The New Bedford mill is thoroughly rebuilt and arranged for a double issue, although we understand that only one issue will be used at present. The double issue when properly used has proved an improvement over the old arrangement of single issue. So say those who have used them. The Briggs mill, one of the best managed mills in the Territory, is arranged with a double issue. The company have in their employ the best machinists and millmen they can procure, and the change from single to double issue was decided upon after a careful comparison, they having altered only part of their batteries at first, and then by running both by double and single issues on the same grade of ore, were able to determine and decide knowingly, which they did in favor of the double issue. They report that a third more ore can be put through with the same yield per cord than by the single issue.

The *Herald* says: "The Lexington mill, after rusting in idleness for years, has at length fallen into energetic hands, and is no longer an object of contempt; it commands respect. It is one of the props of the country. This morning we saw a gold retort at Warren Hussey's bank weighing forty-seven ounces that came from this mill. It was the product of nine cords of Rhoderick Dhu ore. The retort was first-class, clean and bright. The crevice is from four to five feet wide, and pays handsomely."

Nevada.

THE MANHATTAN MILL AND THE NEW STETEFELDT FURNACE.

We extract the following from the Reese River *Reveille*, of 29th ult.: "The Manhattan mill has broken its long silence. It is now fairly under way, and every part of the new machinery erected in connection with the new Stetefeldt furnace works as smoothly and steadily as clock-work. We shall not here go into a detail of the principles and mechanical workings of the Stetefeldt furnace. This has already been done in these columns in so thorough a manner as to render any further description a work of supererogation. That it will accomplish its work satisfactorily, there can be no doubt. It has been built under the immediate supervision of the inventor himself, who is there now to see that everything comes up to the promised standard. We noticed, on a line with the bottom of the furnace, a series of brick chambers which we had not seen in the original drafts of the furnace, and which, we were told, are dust chambers, intended to collect the lightest particles of roasted ore which would otherwise float away in the atmosphere. The mouth of the furnace being much higher than the batteries, the pulverized ore is carried up to it by means of an elevator, which drops it in a hopper. In the first furnace built at Reno, the pulp was deposited in a bin whence it had to be fed in the furnace by hand. But here the ingenuity of Mr. STANDISH, the inventor of the steam-plough, has obviated the necessity of this manual labor. The pulp, which, as we, said, is elevated into a hopper, drops from this into a wooden box extending from the bottom of the hopper to the mouth of the furnace. In this box is a screw which revolves and conveys the pulp. The motion of this screw can be accelerated or slackened so as to regulate the feed of the furnace. Another hopper, intended for salt, stands alongside of the one into which the pulp is elevated. It also drops into the box or screw conveyor, and by a cunning arrangement in the motion, the salt is dropped in the furnace in the required proportion to the pulp. Thus no manual labor is required from the time the quartz is dropped in the battery until it is taken out of the furnace ready for the amalgamating room. The house in front of the battery is well filled with quartz, a portion of which is custom ore. It is all of a high grade. Mr. FROST opened a sack of ore taken from a heap of others. Every piece in it was good enough for a cabinet specimen of ruby ore; it was taken out of the Oregon shaft of the company. There are in front of the mill probably one hundred tons of ore which will average $500 per ton. We place this at a very low estimate, for there are small lots which will work from $1,000 to $2,000 per ton, and there is not a pound that will work less than $250 per ton. We can but congratulate Messrs. CURTIS and FROST, to whose skill and good management the Manhattan Company is indebted for its prosperity, on the fine prospects now before them."

California.

FROM SAN DIEGO.

The San Diego correspondent, of the San Francisco *Bulletin*, under date of June 20, writes: "In spite of the talk among the miners of resistance, etc., the "Cuyamaca Grant" was surveyed last week, taking in all the mines and ranches worth anything everywhere in the vicinity. The claimaints say they paid their money and intend to fight it out, while the miners and others interested, having procured the services of Gregory Yale, intend to fight said claim till there is no more fight in them. The latter gentlemen informs said miners and others that the "claim" is a fraud, and says he is sure to defeat it! In the meantime, everything is uncertain about the mines, except their richness, of which there seems to be no doubt. Nothing but the claim keep things back, and that is the case all over the country. It is very difficult to find a quarter section of decent land within a day's journey of this town which is not covered by some land grant. In this town things are quiet, but buildings and improvements still go on. They command a pretty high price, but as the hay crop is abundant in Santa Barbara, and can be bought at from $3 to $10 per ton delivered at the wharf there in bales, it is not likely to go up any higher here than at present, but will probably be lower. Barley and corn continue cheap. It is a great pity the mill here is not running, even if there be no grain raised in this county. Grain can be shipped from San Francisco as cheap as flour can, and it is a great accommodation to everybody to be able to buy fresh cornmeal, bran, middlings, etc., fresh from the mill. The mining expedition which left here for lower California, on the schooner *Restless*, returned last week, without finding anything half as good as we have nearer home. There are good mines, without doubt, on the Peninsula somewhere between the San Borja and San Ygnacio, but the obstacles to be encountered in the development of minerals in that desert and mountainous region are not easily overcome. The little steamer *Vaquero* has just arrived from San Quentin, Lower California, with a cargo of salt, having taken down coal for the steamer *Prince Alfred*. Weather pretty cool, and cloudy for the season, with a good deal of wind.

RICH STRIKE IN SHASTA.—A dispatch, dated Shasta, June 25th, says: Rochon & Co., brought into town to-day a chunk of solid gold, weighing 184½ ounces. This piece of gold was taken out of their claim situated on Spring creek, in the vicinity of this place. They also bring in considerable coarse gold, and some very rich gold-bearing quartz, from a ledge discovered on their claim. This rich strike has caused much excitement, and miners are locating claims up and down the creek.

British Columbia.

A NOTE OF WARNING.

THE Mariposa *Free Press* says: "A personal friend of ours, who has spent several years in British Columbia, and is well posted in matters pertaining to mines in the British possessions on the Pacific coast, sends us a few words of warning, with the request to publish them for the benefit of whom it may concern. It appears that the Colonial Government assisted an expedition fitted out for prospecting in the neighborhood of Peace river and its tributaries. The party went to Quesnelle for fresh supplies, and made a true and correct report of the amount of gold taken out, and the length of time they had worked. Now every paper in the colony declares that the party kept back the truth about the diggings, and that they took out a very large sum. They know that such is not the case, but are anxious to get a few thousand miners to go there to be fleeced. In reference to the alleged rich discoveries, our correspondent writes as follows: The only place where paying diggings have been found yet is on a small creek called Vital creek, on a branch of the south fork of Fenlay branch of Peace river. The diggings were found last June, and paid moderate wages—nearly half an ounce a day to each man. The creek is now taken up for a long distance—much more than will pay. The gold belt is very narrow, and although parties have been prospecting on all the neighboring creeks, no diggings have been found outside of Vital creek that would pay a Chinaman to work. It is possible that there may be rich diggings here, but they have not been found yet. Let every man in California who sees colonial or other newspaper articles headed 'Rich and extensive diggings in the Omleca Mines,' read all such statements with 'thumb to incredulous nostril.' There were some bar diggings found some years ago down on Peace river, and also on Nation river, but they have been abandoned for a long time. There was a rush of miners at that time. I was in the colony then, and know that but few of them made expenses. Any miner who is fond of prospecting and wishes to see the country, and has in his possession a few hundred dollars that he has no particular use for, let him pitch in. All others had better stay away."

Montana.

SUCCESSFUL SMELTING AT PHILLIPSBURG.

A correspondent of the *New North-west* newspaper, writing from Phillipsburg, June 27, reports that the smelting furnace recently erected there is a success. "The company claim to have demonstrated the fact, in two attempts, that with proper flues it will work. Some 300 pounds of bullion is said to have been run from both experiments. It has been thought best by the management, however, to procure flux from elsewhere before attempting a big run. I am fully persuaded that, with experienced management, no trouble need be anticipated. Messrs. CRUTCHFIELD and SWAN, said to be fine practical smelters, now preside over the furnace exclusively, and you will doubtless soon hear of 'big buttons,' 'great success,' etc. No final disposition has been made of the St. Louis mill as yet. Should parties now negotiating for the lease succeed in obtaining it, confidence in its future management will be evidenced by many new leads being opened, and ore brought to the surface. Enough paying ore is deemed in sight to justify the earliest possible commencement of milling operations."

The *New North-west* says, editorially, concerning the above smelting works: "Every one at Phillipsburg seems satisfied that COLE SANDERS's smelting furnaces are an unqualified success, be

cause ore has been reduced and a rich yield made. Mr. SANDERS has been about three months building them, and their cost, including engine, etc., will be near $15,000. The capacity of each is about six tons per day. The ore smelts well, several hundred tons are out, and coal is abundant. Teams have gone to Argenta for litharge, and in a few days the second furnace will be started up."

BULLION SHIPMENTS.

The Helena *Herald*, in noticing a huge "brick" at the banking house of S. H. BOHM & Co., says: "We stepped in and found them casting a huge gold brick—the largest one of the season—of the coin value of $20,200. It will be shipped east by WELLS, FARGO & Co.'s Express, in a few days. Mr. BOHM informs us that gold dust generally is not coming in as rapidly as last year at this time, on account of the late season, caused by the heavy snow storms and rains. The season last year commenced in the early part of May, and this year hardly in June; but the shipments of bullion by this house during the present month, as compared with the corresponding month of last year, will be only a trifle less. In all probability, the product of gold from Montana for 1870 will exceed that of any previous year. The banking-house of S. H. BOHM & Co. will ship the present season, (calculating from the commencement,) not less than $2,500,000. This is only the shipment of one house, and there are others in Helena, which will probably ship equal amounts. This is certainly a pretty good showing for Montana."

ON DIT ABOUT MINES AND METALS.

Missouri Zinc.—The yield of our zinc mines, says the St. Louis *Journal of Commerce*, up to the first of June, was 2,600,000 lbs., and the product this year will average 1,060,000 per month, which is converted into zinc ingots and spelter by our Carondelet furnaces. Considerable quantities of zinc are coming in from the new mines near the South Pacific Railraad.

Indian Salt.—The Viceroy of India recently visited the ancient salt mines of Pind-Dadun-Khan, in the Punjab, 110 miles northwest of Lahore. These mines are interesting as dating from the days of Alexander, and as being worked by the actual descendants of the original miners. One of the mines (nine in all) contains a circular hall 90ft. across and 40ft. high. The supply of salt seems inexhaustible.

The Big Horn Expedition.—The Laramie *Sentinel* publishes the following in relation to the Big Horn Expedition: "Judge JONES informed us that but little was known of the party since they left Camp Brown, and struck out into the wilderness, further than that they went beyond the reach or hearing of their friends among intensely-hostile Indians; and the Judge expressed the belief that not one of them would ever get out alive. Judge JONES would not express such an opinion, if there were not the best grounds for apprehension of the worst."

Continuity of Colorado Ore Veins.—A Colorado paper says: "The tapping of the Equator vein through the Marshall tunnel, which has been looked for with increasing interest from day to day, has been accomplished at last. The tunnel has been driven into Leavenworth mountain about 680 feet. One of the walls of the Equator has been pierced, and pieces of the vein matter, identical with that met in the shaft, were taken out, one of which was shown to us. It is uncertain whether the Equator has been tapped above or below the bottom of the shaft, which is over 400 feet deep. The incident is of the greatest importance, as fixing the continuity and permanence of our silver veins to great depth."

Pacific Coast Treasure Product.—The San Francisco *Bulletin* gives the following statistics:

The receipts of domestic coin and bullion at San Francisco for the quarter ending June 30th, through Wells, Fargo & Co.'s Express, amounted to $11,301,325, and for the first six months of the year, $20,838,088, as follows, as furnished by THOMAS P. CARROLL, of the Auditing Department:

FROM THE INTERIOR.

	Uncoined.	Coined.	Total.
January	$2,225.151	$683.649	$2,908.800
February	2,095,299	384,223	2,479.522
March	2,444,122	601,842	3,045.964
April	2,559,078	524 814	3,083,892
May	3,015,818	398,289	3.414 107
June	3,246.895	414,184	3,661,079
Totals	$15.586,363	$3,007.001	$18,593,364
COASTWISE.			
January	$310,359	$216.500	$526 859
February	215,387	106,960	322 347
March	118,387	134.885	253.272
April	209.278	117,095	326,373
May	254,081	89,881	343,962
June	352,241	119.670	471,911
Totals	$1,459,733	$784,991	$2,244,724

Following is a recapitulation of the forgoing totals, to which are added the imports foreign for the same period:

From California and Nevada	$18.593,364
Coastwise, North and South	2,244.724
Mexican Coin, per Wells, Fargo & Co	494,998
Total per Express Company	$21,333,086
Imports foreign to other consignees	1,777,034
Total receipts January 1 to June 30, 1870	$23,110,120

Of the uncoined treasure received for the past six months, $6,781,175 was silver bullion, chiefly from Nevada, and $10,281,613 gold dust and bullion, principally from California. Included in the imports foreign was upwards of $1,000,000 in Japanese coin, to be recoined.

The treasure remittance to New York by railroad for the past six months, through the Express Company, was as follows:

	Silver Bars.	Gold Bars.	Coin.
January	$113,100	$278,017	$544,378
February	142,700	235,433	898,620
March	137,206	150,793	1,535,300
April	58.400	189,506	533,850
May	22 497	72,724	449,400
June	76 937	389,181	88,300
Totals	$530,800	$1,315,654	$4,049,848

Showing a shipment to New York, for the six months, of $5,896,302.

The coin remitted to the interior, through the same agency, since January 1st, has been as follows:

January	$1,765,265	April	$1,295,032
February	1,039 702	May	1,304,959
March	1,175 286	June	1,796,092

Making a total of $8,376,336. The receipts and remittances of coin to and from the interior, for the first six months of the year compare as follows:

	1869.	1870.
Received from interior	$6,115,506	$3007,001
Remitted to interior	9,644,214	8,376,336
Added to interior circulation	$3,528,708	$5,369,335

During the same time in 1868, we received $2,822,692, and remitted $5,235,420, against $2,554,859 received and $4,724,573 remitted same time in 1867.

SPECIAL SCIENTIFIC BREVITIES.

Berlin University.—Recent advices from Berlin inform us that the University in that city has 1,393 matriculated students (385 foreigners) for the present term. Besides these, 1,323 persons who are not matriculated are allowed to attend lectures, making altogether 3,316 students in attendance.

Bronze Guns.—The *Engineer* (Eng.) says that the Belgian Government has been making a series of highly important experiments with bronze guns. Two guns in the hands of the committee endured respectively 2,673 and 1,362 rounds. Several methods are employed for giving the guns greater hardness and tenacity than is possessed by ordinary bronze—alloying with posphorus being one of the chief of these, though chill casting is highly recommended.

Compound Engines.—The English scientific journals are largely discussing compound engines against non-compound. The *Engineer* holds that a non-compound engine is equal in economy to a compound one when the degree of expansion is the same. It also says that weight and first cost are greatly in favor of the non-compound. *Engineering* takes the opposite view of the case. The facts seem to be that the best compound engines have failed to equal the performance of good Cornish single engines.

Bessemer vs. Sea-Sickness.—HENRY BESSEMER's latest invention is a cabin for preventing sea-sickness. It is built in the shape of a dome, is hung amidships like a compass-box (similar principle), and is capable of preserving itself in an upright position when the ship inclines at an angle of 30°. It adds an immense load to a vessel, and will not probably amount to much. The vertical motion, which Mr. BESSEMER attempts to avoid by putting his cabin amidships, is the primary cause of sea-sickness, and will exist in any vessel, and in any part of her, while she is at sea.

Quality of Ice.—The French steamship company (Les Messageries Imperiales) having to ship a quantity of ice to Suez for the use of its steamers in the Indian ocean, and desiring to find the best quality for their purpose, subjected 220 pounds of several kinds to the same conditions of temperature, with the following results:—Natural ice from Switzerland lasted 107 hours; natural ice from Norway, 115 hours; artificial ice made by the Carre machine, 130 hours; natural ice from Boston, Mass., 138 hours; artificial ice made by the Tellier machine, 144 hours. Artificial ice, then, appears to be as solid as natural ice.

Cause of Rusting of Iron.—It has usually been supposed that the rusting of iron depends principally upon moisture and oxygen. It would appear, however, from Dr. CARVER's experiments, that carbonic acid is the principal agent, and that without this the other agencies have very little effect. Iron does not rust at all in dry oxygen, and but little in moist oxygen; while it rusts very rapidly in a mixture of moist carbonic acid and oxygen. If a piece of bright iron be placed in water saturated with oxygen, it rusts very little; but if carbonic acid be present, oxidation goes on so fast that a dark precipitate is produced in a very short time. It is said that bright iron placed in a solution of caustic alkali does not rust at all. The inference to be derived is, that by the exclusion of moist carbonic acid from contact with iron, rust can very readily be prevented.

Oxygen Light.—M. TESSIE DU MOTAY has succeeded in obtaining a beautiful oxhydric light by means of oxygen gas and supercarburetted hydrogen, doing entirely away with the lime, magnesia, or zircon pencils, which were the greatest objection to the universal application and public adoption of this new light. The great recommendation of this light is its brilliancy and cheapness. The cost, as we are told, is only two centimes per burner for five hours, or at the rate of three cents per week, for five hours each of the seven nights. In using this new method, M. TESSIE DU MOTAY has also avoided the high pressure formerly used, in order to obtain the brilliancy desired, and the two gases now arrive at the burner at a pressure of about one inch water column. The manufacture of oxygen by the manganate has also enabled M. TESSIE DU MOTAY to fulfil large contracts with alcohol bleachers and distillers in Paris and London, who are using the manganates to bleach and deodorize their spirits, to obtain the colorless and odorless Cologne spirits.—*Exchange.*

New Kind of Powder.—According to the *Moniteur Scientifique*, the owners of some powder mills in Sweden have introduced a new kind of powder, which contains, it appears, a mixture of nitrate of ammonia and nitrate of potassa (with what other substances is not said). This material is, according to some accounts, a more powerful explosive than nitro-glycerine, and cannot be ignited, or made to explode, but by the impact of a blow, or a falling weight, or by the detonation of a small cartridge containing common gunpowder. Experiments made at a military establishment at Berlin, with this powder, have proved that while ordinary gunpowder, gun-cotton, nitro-glycerine, and dynamite take fire the moment flame is approached, this powder did not do so. As regards the effect of the impact of a blow or a falling weight (the same, of course, in each case), ordinary gunpowder requires for explosion that the weight fall from a height of between four and five feet; nitro-glycerine, one and a half feet; dynamite, two and three-quarters feet; and ammonia gunpowder, between twelve and fifteen feet. The results of some experiments made in France with the same powder, were not confirmatory of the high opinion formed in Berlin.

Gas Wells.—We learn from the Erie *Republican* that in that city several wells of this kind are in operation, with most favorable results. The one recently finished by OLIVER & BACON, of the Canal Mills, was commenced about a month ago, and two forty horse-power boilers are now run by the gas. The well is 493 feet in depth, and cost, including casing, pipe, etc., about $1,500. The supply of gas is more abundant than they need, and is thought to be sufficient to drive two additional run of stones. When they were running fifteen hours per day, the cost of the necessary coal was $400 for the month of June. Now, for the interest of $1,500, or $8 75 per month, they have a sufficient supply of fuel to run continually, a saving of nearly or quite $5,000 per annum. With regard to the continuation of the supply, they can only go by the precedents furnished in the same locality.

The Althoff well, in the same city, produces as much gas as when it was sunk eight or ten years ago. Messrs. BUSSECK & CLARK have also recently put down a well of this kind, at a cost of $1,600, to a depth of 503 feet. The gas which is consumed under the stills and boiler of a petroleum refining establishment is supplied more abundantly even than in the Canal Mills well, and is estimated as sufficient for a two hundred horse-power boiler. We recently called attention to a similar well in another part of Pennsylvania, in the columns of the ENGINEERING AND MINING JOURNAL.

MISCELLANEA.

Canal at Macon.—It is proposed to build a canal which, besides furnishing water to Macon, Ga., will give it an immense water power for manufacturing purposes.

American Manufacturers.—It is estimated that 1,900,000 persons are employed in manufacturing establishments in the United States, and that the number supported thereby is 10,000,000. Of this number 640,000 are employed in the manufacture of iron, steel, and in mining ore and coal. The amount of capital employed in the manufacture of iron and steel is $420,000,000.

The Consolidated Burro Mining Company was incorporated last month, with a capital of $9,000,000, divided into 360,000 shares, of the par value of $25 each, representing 14,000 feet. The claim is located in the recently discovered mines in Grant county, New Mexico. The trustees are ROBERT MORROW, S. HEYDENFELDT, G. D. ROBERTS, JESSE S. WALL and J. B. COOPER.

Destruction of Timber.—The report of the United States Department of Agriculture comes to the startling conclusion that such is the wholesale destruction of our American forests, unless immediate measures are taken to supply their places by new plantations, there will be an actual famine for wood in this country within thirty years. It is estimated that from 1850 to 1860 fifty million acres of new land were brought under cultivation, two-fifths of which were timber land, and that in the present decade no less than a hundred millions will be so reclaimed. If the present demand continues, in twenty years our increased population will need $200,000,000 worth of sawed lumber annually. No account is taken in this loss of a great source of material wealth, of the injury to life, industry, and commerce from the change of climatic influences resulting from the destruction of our forests.

The Meat Preserving Business at Melbourne, Australia, it is said, is very successful, several factories being in operation, and the demand for canned meats having rapidly increased, both in England and Australia. During the last six months of 1869, the Melbourne Meat Preserving Company put up 160,752 sheep and 580 head of cattle, the former costing $291,565 and the latter $16,490. The wages amounted to $421,065 and the profits are estimated at $55,000. At first the meat arrived in England in a condition unfit for food, but two years' experience has instructed the manufacturers so that the business has become profitable. This branch, it is reported, has kept up the price of sheep, so that the contemplated abandonment of the stock-raising farms has been prevented. Sheep in Australia are selling at $1 74 per head, and one company at Melbourne has increased its consumption to 6,000 sheep a week.

Railroad to White Pine.—The San Francisco *Bulletin* of the 28th ult. says: "A movement is on foot for building a railroad to White Pine to connect with the Central Pacific. Such a road is much needed, and will be likely to hasten the development of a large mining region. If it reaches White Pine, there is no telling how much further south it will go. Its terminus will furnish another base from which our veteran prospectors will skirmish out and find new inducements for roads beyond. With branches to Virginia and Carson, to White Pine, and a branch northward to Oregon, the ten years allowed by Seward's sanguine vision, for the transformation of the desert interior into verdant fields, may not seem so unduly brief. There is little doubt of the profit of this White Pine railroad. If the resources of that region are adequate to sustain the present costly means of transportation, a railroad will pay abundantly, both directly and indirectly, by expanding the business to be transacted."

New Mode of Sharpening Files.—M. WEDERMANN's plan is as follows: Well-worn files are first carefully cleaned by means of hot water and soda; they are then placed in connection with the positive pole of a battery, in a bath composed of forty parts of sulphuric acid, eighty parts of nitric acid, and a thousand parts of water. The negative pole is formed of a copper spiral surrounding the files, but not touching them; the coil terminates in a wire which rises towards the surface. When the files have been ten minutes in the bath they are taken out, washed and dried, when the whole of the hollows will be found to have been attacked in a very sensible manner; but should the effect not be sufficient, they are replaced for the same period as before. Two operations are sometimes necessary, but rarely. The files thus acted upon are to all appearances like new ones, and are said to be good for sixty hours' work. M. WEDERMANN employs twelve medium Bunsen elements for his batteries.

The Amsterdam Ship Canal.—Next to the Suez canal in magnitude is the Amsterdam Ship canal, which has been in progress about five years, and is expected to be completed in 1876. The canal is being formed through two lakes, both of which are shallow, first by making embankments on each side of the line of the canal, and then by dredging out the material between to the required dimensions. A deep excavation is being rapidly formed from the lakes to the North Sea, through the sand-hills, and outside this, piers built of large concrete blocks, are in progress, which will extend about a mile into the sea, and enclose within them an area of about 200 acres, which will be dredged to a depth of twenty-four feet below low water. The canal will also have three locks at the North Sea entrance, a little eastward of the harbor. The canal will have a width at the bottom of eighty-eight feet, which is sixteen feet wider than the Suez Canal; a width at the top of one hundred and ninety-five feet, and a depth of twenty-three feet. The locks will be wide enough to admit ships of the largest class.

Diving.—The greatest depth to which a diver can descend, with the greatest appliances of safety, is about one hundred and sixty feet, and for this a bunch of hundred-weights must be disposed about his person. The average depth at which he can work comfortably is about ninety feet, which was near the depth at which the operations upon the "Royal George" were conducted. In the water, from sixty to seventy feet deep, the men can work for two hours at a time, coming up for a ten minutes' rest, and doing a day's work of six or seven hours. An English diver, encased in one of Siebe's dresses, went down in the Mediterranean to the depth of one hundred and sixty-five feet, and remained there for twenty-five minutes; and GREEN, the American diver, is said to have inspected a wreck in one of the Canadian lakes at the depth of one hundred and seventy feet, but his experience was enough to convince him that he could not work on it without danger of life. At this depth the pressure of water on the hands is so great that it would speedily suffocate the diver. Means have been tried to obviate these difficulties, but for the present a limit has been set to the extent to which man may penetrate the secrets of the deep. An ingenious Italian workman has brought to England a sort of armor-dress which would resist the pressure of water, but submarine engineers think that this would not obviate the difficulties arising from the limits placed to human endurance.

MARKET REVIEW.

The Coal Trade.

NEW YORK, July 22, 1870.

There is a good demand for coal this week and a consequent good feeling among dealers. What coal is in the market is readily taken at our quotations. All the regions except Schuylkill are now busily at work, and are sending down a greater quantity of coal to tide water than ever before. This increased production is very favorable, as it relieves the market from the pressure Schuylkill would otherwise be able to bring upon it.

The threatened strike in Wyoming and Lehigh upon the eight-hour question has blown over and the men are now all at work upon the ten-hour system. Schuylkill is very anxious to go to work, but as yet little can be said as to what will be the result. We hear that there is a joint meeting at Pottsville of miners and operators, at which it is hoped that an adjustment will be effected. This hope has been excited so often and then disappointed that we can place no great confidence in it.

As a movement against the Vessel Owners' Association, of which we made mention last week, a notice has been issued to masters of vessels as follows:

NOTICE TO MASTERS OF VESSELS.

Coal freights may be obtained from the shipping ports of Rondout, Newburgh, Hoboken, Port Johnston, and Elizabethport, without any expense for commission or brokerage, on application at the following offices in New York city:

Delaware and Hudson Canal Co.	71	Broadway.	
Pennsylvania Coal Company	111	"	
Wilkesbarre Coal and Iron Company,	80	"	
Del. Lack. and Western R. R. Co.	26	William st	
Quintard, Ward & Co.	9	Pine st.	
Kollock & Sherwin	106	Broadway.	
Lewis Audenried	110	"	
Castner, Stickney & Wellington,	39	Trinity Build'g,	
111 Broadway.			
A. Pardee & Co.	No. 34	Trinity Building	
Samuel Bonnel, Jr.	" 43	"	
Caldwell, Conant & Weston,	" 35	"	
C. A. Blake & Co.	" 6½	"	
E. A. Packer	" 29	"	
G. B. Linderman & Co.	" 50	"	
White, Fowler & Snow.	" 49	"	
Davidson, Young & Co.	" 16	"	
Randolph Bros.	" 28	"	
W. D. Marvel & Bro.	" 61	"	
Nicholson & Weld.	" 15	"	
Weld, Nagle & Co.	" 17	"	
Hurd & Dean	" 18	"	
Walter Donaldson & Co.	" 19	"	
Honey Brook Coal Co.	" 23	"	
Day, Huddell & Co.	" 7	"	
Van Wickle & Stout	" 44	"	
Van Dusen Bros. & Co.	" 5	"	
Chamberlin & French	" 72	"	
J. G. Moody	" 68	"	
Tredway & Wells	" 71	"	

This will, we hope, effectually extinguish the association aforesaid.

LATER NEWS.

POTTSVILLE, July 22.—The Workingmen's Benevolent Association of the Schuylkill district met here in session yesterday and to-day, and proposed to operators a basis which is in effect that of 1869, except that the fluctuations above and below $3 are to regulate the men's wages on a scale of thirty-three per cent., instead of twenty, as contemplated by that basis.

A committee from the convention had a long consultation with a committee of operators, which ended in the total disagreement of both parties.

FRANKLIN B. GOWAN, President of the Philadelphia and Reading Railroad Company, was present, and expressed his intention to lower the coal freights on that road at once.

The Shamokin *Herald* says the trade continues about the same as reported last week. The eight collieries, then named as being idle, have not yet resumed. One of this number, the Lambert, is worked out of coal, and will not be able to start up again until its slope is sunk another lift.

From 400 to 500 cars per day are now sent over N. C. R. W., comprising about two-thirds of the the entire shipments of our region.

Several of the collieries at Mt. Carmel are now working under the eight-hour resolution, and at Shamokin, on Wednesday last, a vote was taken on this question at several collieries, which, we learn, has gone in favor of the new movement. This result was somewhat unexpected. The resolution is not to be enforced here until a majority of the collieries is obtained.

From what we can learn there is but little prospect of resumption in Schuylkill this month.

On Monday last the Hickory Ridge and Monitor, two new collieries commenced preparing coal.

The Hickory Ridge (J. Langdon & Co., operators,) will have, when completed, the most extensive breaker in our region, and when the proper openings are made will be able to ship 150 cars per day.

The Monitor, located in the Locust Gap Region, is operated by Heim, Beck & Reyers, and is reported to be able, when fully started up, to ship from 75 to 100 cars per day. In a future article we will notice the improvements more extendedly.

On the 11th inst., according to the terms of the lease between the Reading Railroad Company and the Schuylkill Navigation Company, the Canal of the latter was transferred to the former for a term of ninety-nine years. It is given out that many important changes in the conduct of the business of the Canal will be made at once, with a view to economising the cost of its operations. The *Miners' Journal* says: "The shipping at Pottsville and Port Carbon will be done away with, and Schuylkill Haven will be made the only general shipping point at that end of the line. This will do away with a number of officers and employés heretofore employed at the points mentioned. Colonel Thomas C. Zulick, who, for twenty-one years has performed the duties of Collector at Schuylkill Haven, will be superseded by one of the Railroad Company's officers, who will perform the duties of both offices." It is the intention of the officers of the Company to reduce the number of employés along the entire line to as few as possible, and whenever consolidations can be made to advantage it will be done.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending July 16, 1870, compared with week ending July 17, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila. & Reading R.R.	105,117	1,602,340	22,577	1,118,210
Schuylkill Canal	30,240	281,336	1,617	56,831
Lehigh Valley R. R.	60,5-8	1,123,531	42,860	1 710,930
Lehigh & Sus. R. R.	23,331	365,738	20,049	527,816
Lehigh Canal	36,072	239,237	24,900	248,171
Scranton North		207,062	17,811	366,767
" South	3,022	698,699	35,533	957,527
Penn. Coal Co., rail	22,996	512,345	24,954	603,322
" " " canal	339	5,065	836	8,651
Del. & Hud. Canal Co.	22,677	572,109	50,629	732,094
" " R. R.	255	98,817	8,252	251,684
" " south		49,014	11,382	238,836
Shamokin	11,262	177,346	16,213	191,544
Trevorton	826	9,448	2,000	42,200
Lykens Valley Coal Co.	1,920	34,103	5,932	50,346
Wyoming South	13,454	83,955		
P. N. Y. C. & R. R. Co.			8,074	163,291
Williamstown, Col'y.	6,737	83,022	6,296	150,771
Short Mountain	1,793	51,106		
Total	340,449	6,106,253	319,344	7,490,961
1869	319,944			6,106,253
Increase week and year	20,505			1,384,708

* Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending July 16, 1870, compared with week ending July 17, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	23 071	530,821	19 576	445 584
C. & O. Canal	17 908	271,513	14 891	271 513
H. & B. T. R. R.	9,096	188,626	6,580	166,628
Harrisburg & D.	....	....	14,128	417,742
L. V. R. R.	....	552	....	8,229
P. & N. Y. C. & R. Co.	....	....	5,277	292,531
	50 075	961,512	60,452	1,602,227

Schuylkill Coal Trade.

Report of Coal transported via the P. and R. R. for the week ending July 14, 1870—less coal carried for Company's use, and Bituminous Coal:

For week	22,577 08
Previously this year	1,165,672 17
Total	1,188,210 05
Same time last year	1,602,340 10
Decrease	414,129 15
Amount sent same week 1869	105,117 09

Amount of coal transported on the Philadelphia and Reading Railroad for the week ending Thursday, July 14, 1870:

From St. Clair	7,222 11
" Port Carbon	1,987 17
" Pottsville	— —
" Schuylkill Haven	6,611 14
" Auburn	439 14
" Norristown	— —
" Port Clinton	2 601 09
" Allentown and Alburtis	3,714 03
" Harrisburgh and Dauphin	14,128 11
Total paying freight	36,705 19
Coal for Company's use	2,744 58
Total for week	39,450 07
Previously this year	1,576,909 19
Total	1,616,360 06
To same time last year	1,897,554 12

Report of coal transported over the Schuylkill Canal for the week ending Thursday, July 14, 1870.

	Tons. Cwt.
From Port Carbon	391 00
" Pottsville	— —
" Schuylkill Haven	1,226 00
" Port Clinton	— —
Total for week	1,617 00
Previously this year	55,184 18
Total	56,801 18
To same time last year	281,336 05

Report of Coal Transported over Lehigh Valley Railroad

For the week ending July 16, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	15,981 00	366,587 17	381,669 06
" Hazleton	50 913 17	1,108,236 14	1,159,150 11
" Upper Lehigh	58 01	7,616 10	7,674 11
" Beaver Meadow	18,354 15	393,723 16	412,078 11
" Mahanoy	4,191 12	128,258 15	132,450 07
" Mauch Chunk		447 17	447 17
Total Anthracite	88,599 14	2,604,871 09	2,693,471 03
Bituminous Coal recv'd from Cata. R. R.			
N. C. R. R.			
E. P. R. R.		8,229 00	8,229 00
P. & N. Y. C. & R. R. Co			
Fall Creek			
Schroeder			
Towanda			
Total by rail and canal	88,599 14	2,013,100 09	2,101,700 03
Same time last year	77,307 03	1,192,283 18	1,269,594 01
Increase	11,292 11	820,813 11	832,106 02
Decrease			
Forwarded East from M'h Chunk by rail	62,860 19	1,648,069 04	1,710,930 03
Same time last year	60,388 15	1,062,942 09	1,123,331 04
Increase	2,472 04	585,126 15	587,598 19
Decrease			

RECAPITULATION.

Forwarded East from M'h Chunk by rail	62,860 19	1,648,069 04	1,710,930 03
To N. C. R. R., at Mount Carmel		115 00	115 00
Forwarded North from L. & B. Junction	8,074 04	154,886 07	162,960 11
To L. & S. R. R. at Packerton for rail	131 16	4,393 05	4,524 15
Delivered at M'h Chunk	5 07	736 18	742 05
Delivered on line of road above Mauch Chunk	85 14	7,325 17	7,421 11
Delivered above M. Chunk for use of L. V. R. R.	960 16	31,218 17	32,179 13
To L. & S. R. R., at P'n Hav., for railroad			
Do. for canal	10,919 11	106,290 11	117,240 02
At M. Chunk for canal	5,521 15	51,835 15	57,357 03
Total Anthracite	88,599 14	2,004,871 09	2,093,471 03
Bituminous Coal		8,229 00	8,229 00
Total all kinds	88,599 14	2,013,100 09	2,101,700 03

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending July 16, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons ct	WEEK, 1869. tons ct	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	30070 08	25940 12	622147 09	337001 09
Upper Lehigh Region	3238 08	3151 04	71121 08	62584 15
Mahanoy Region	735 00	96 04	699 00	1070 17
Hazleton Region	11144 18	9849 04	122.69 04	67346 09
Beaver Meadow Region	5422 13	5608 17	57459 09	34875 18
Mauch Chunk Region	210 19	15372 09	30781 09	140362 05
Totals	50222 06	60218 10	904476 18	641179 13
Increase			238.97 05	
Decrease	9996 04			
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	20008 08	23331 19	527216 01	366736 09
Forwarded East of Mch Chunk by Canal	24900 17	36072 13	248171 00	239237 12
Delivered at and above Mauch Chunk	1015 00	813 18	22023 19	17364 03
Delivered to L. & B. R. at Plymouth Bridge	4298 01		106465 18	13698 01
L. V. R. R. at Sugar N.				5151 03
Totals	50222 06	60218 10	904476 18	641179 13
Of the above there was from Mines controlled by Co., W. S. C. & I. Co	16799 08	12962 15	278154 14	177391 05
L. C. & N. Co	216 19	16289 09	47435 06	165460 14
Totals	17010 07	29252 04	325590 00	342771 19
Increase			7181 19	
Decrease	12241 17			

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending July 14, 1870:

	Tons.
For week	14,128 11
Previously this year	403,614 07
Total	417,742 18

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, July 16, 1870.

	WEEK.	SEASON.
North	43 007 06	1,217,8 9 19
South	11,382 09	238 836 10
Total	54,389 15	1,456,646 09
Corresponding time in 1869.		
North	2,648 01	712,651 15
South	.....	47,297 09
Total	2,648 01	759,949 04
Increase North	40 359 05	Increase 505,158 04
Increase South	11 382 09	Increase 191,539 01
Total Increase	51,741 14	Increase 696,697 05

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via the Pennsylvania and New York Canal and Railroad Company, for week ending July 20, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	8,074 04	155,317 09	163,391 13
Bituminous	5,277 00	123,863 00	129,140 00
Total, Ant. and Bit.	13,351 04	279,180 09	292,531 13

Shipments of Cumberland Coal

for the week ending Saturday, July 16, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M.	.....	.....	.....
Borden	1,956 14	1,956 14	4,541 12
Consolidation	3,849 03	3,849 03	7,467 16
Spring Hill	522 08	.....	522 08
Midlothian	58 13	115 18	174 11
H. and Baltimore	....	1,343 16	1,343 16
do Va M	1,620 00	.....	1,620 00
V C & I Co	360 16	.....	360 16
G. C. C. and I.	1,557 08	355 07	1,912 15
Maryland	3,124 11	4,582 06	7,706 19
American	1,721 19	4 398 11	6,120 10
Atlantic	468 16	.....	468 16
Piedmont	1,118 00	.....	1,118 00
Swanton	1,246 17	.....	1,246 17
Barton	820 00	.....	820 00
Potomac	1,582 15	.....	1,582 15
Franklin	1,977 08	.....	1,977 08
Big Vein	2,103 18	.....	2,103 18
Total week	24,089 06	16 999 09	41 008 15
Previous	476,875 17	288,175 19	765 051 16
Total year	500,965 03	305,175 08	866,140 11

Statement of coal transported over the Cumberland and Pennsylvania Railroad during the week ending Saturday, July 16, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons. Cwt.	B. & O. R. R. Tons. Cwt.	TOTAL. Tons. Cwt.
1870	14,891 16	19,576 18	34.468 14
1869	17,908 12	23,071 15	40,890 07
Increase			
Decrease	3,016 16	3.494 17	6,511 13

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870	258 801 05	445,584 07	704,385 12
1869	271,513 14	500,821 02	772,334 16
Increase			
Decrease	12,712 09	55 236 15	67,949 04

Statement of coal transported over the Eckhart Branch Railroad, during the week ending Saturday, July 16, 1870, and during the year 1870, compared with the corresponding period of 1869:

WEEK.

YEAR.	C. & O. CANAL. Tons. Cwt.	B. & O. R. R. Tons. Cwt.	TOTAL. Tons. Cwt.
1870	2,107 13	2,531 12	4,659 05
1869	2,940 14	2,559 06	5,580 05
Increase			
Decrease	833 01	27 14	860 15

YEAR.

YEAR.	C. & O. CANAL.	B. & O. R. R.	TOTAL.
1870	50,957 12	53.628 12	104.586 04
1869	33,277 16	49,987 08	83,265 04
Increase	17,679 16	3,641 04	21,321 00
Decrease			

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, July 21. R. A.	W. A.	AT PHILADELPHIA, July 22. R. A.	W. A.
Lump	$— —	$5 00	4 50	— —
Steamer	— —	5 00	— —	— —
Broken	— —	5 25	— —	4 25 to 4 40
Egg	5 75 to 6 25	5 25	— —	4 25 to 4 40
Stove	— to —	5 75	— —	4 25 to 4 40
Chestnut	4 50 to 5 40	4 75	-	4 00 to -
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	6 00	— —	— —	— —
Broken	5 75	— —	— —	— —
Egg	5 60	— —	— —	— —
Stove	6 00	— —	— —	— —
Chestnut	5 25	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	— —	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	— —	— —	— —
Honey Brook, Le'h	W. A.	5 25 to 6 00	— —	— —
Spring Mountain	" "	5 25 to 6 00	— —	— —
Sugar Creek	" "	5 25 to 6 00	— —	— —
Sugar Loaf	" "	5 25 to 6 00	— —	— —
Old Comp'y's.	" "	5 25 to 6 00	— —	— —
Cross Creek	" "	25 to 6 00	— —	— —
Enterprise	" "		— —	— —
Girardville	" "	— —	— —	— —
McMichael	" "	— —	— —	— —
Shamokin	" "	5 50	4 50	— —
Lykens Valley	" "	— —	— —	— —
Broad Top	" "	5 50	— —	— —
Hill & Harris	" "	— —	4 50	— —
Henry Clay	" "	— —	4 50	— —
Powelton	" "	5 50	4 50	— —

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

	F.L.	Bro.	Gra.	Eg.	Sto.	Cst.
Lehigh	$3 00	$3 50	$3 50	$3 50	$3 75	$3 00
Wilkesbarre	3 00	3 50	3 50	3 50	3 75	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f.o.b. at Phila.	$5 00
Lemon " "	4 75
Cumberland Vein Coal	5 00
Cumberland C. & I. Co.'s on board	N. Y. 7 50
Maryland Coal Co. "	" 7 00
Consolidated Coal Co.'s "	" 7 00

Company Coals.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port						
Pittston at Newburgh	4 30	4 50	4 50	4 60	5 10	4 20
Lackawana at Rondout	4 60	4 70	4 80	5 00	5 25	4 60
*Wilk'b're at Hoboken	4 65	4 75	5 00	5 25	5 50	4 60
Old Co. Lehigh at Pt. Johnston	— —	— —	— —	— —	— —	— —
Lehigh at E. Port	5 50	5 25	5 25	5 25	5 50	4 75

For freights to different points, see "Freights."

* 25c. advance alongside.

Prices at Baltimore—July, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 30@5 50
Pittston and Plymouth, do	5 00@5 25
Shamokin Red or White Ash, do	5 50@6 00
Lykens Valley Red Ash, do	5 40@5 50
Zerba Valley	25 5@— —
By retail, all kinds per ton of 2240 lbs.	7 00@7 50
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 75@5 00
Fairmont and Clarksburg gas, f. o. b. at L. Point	5 35@5 50

Prices at Georget'n, D.C., & Alexandria, Va.

July, 1870.

George's Creek and Cumberland f. o. b. for shipping $4 55

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@— —
Lykens Valley	— —@— —
Shamokin Red or White Ash	— —@— —
Trevorton and Zerba Valley	— —@— —

Prices of Gas Coals.

July, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 73 Pine st., N.Y.

	Duty, $1 25, gold. Coarse.	Slack.
Block House	$1 75	@- 75
Gowrie	1 75	@- 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@- 80
Lingan	1 75	@- 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Coarse.	Slack Currency.
Fairmount Gas Coal Co. of N. Y.	7 50	@— —
Despard Coal Co.	$7 50	@— —
Penn	— —	@— —
Newburg Orrel Gas	— —	@— —
West Fairmount Gas Coal	8 00	@— —

AT PHILADELPHIA.

Powelton	$7 80

Prices of Foreign Coals.

July, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, New York.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	10 00@12 00
" House "	13 50@15 50
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel	18 00@20 00

Per ton 2,000 lbs. delivered

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven	$2 00

From Port Carbon, 8 cents per ton more.

Less drawback of 80 cents on all Coal shipped east of New Brunswick and south of Cape Henry.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 81
C. R. R., N. J., Easton to Elizabethport	1 12
Shipping expenses at Elizabethport	25
Warfage	10
Total	$2 28

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R. or L. & N. R. R. from M. C. to Easton	$ 81
C. R. R., of N. J., Easton to Pt. Johnson	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 81
Morris & Essex R. R. Easton to Hoboken	1 19
Shipping expenses	25
Warfage	10
Total	$2 35

TO SOUTH AMBOY.

L. V. R. R.	81
B. & D. R. R.	1 09
Cam. & Am. R. R.	
Shipping Expenses	25
Total	$2 15

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	95
C. RR. of N. J. Easton to Elizabethport	1 19
Shipping expenses	25
Wharfage	10
Total	$2 49

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 07
" Port Carbon	1 10
" Port Clinton	1 00

TO NEW YORK.

From Schuylkill Haven	$1 70

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris "	1 10
Freigh "	
Towing	
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris "	2 00
Freight	
	2 40
For re-shipment	2 20
Total	$4 60

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20
Total	$ 2,50

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1.05
Total	$ 2,10

For Re-shipment—30 extra for shipping, and 10 cents. drawback.

TO BOSTON.

Sydney	$— —
Lingan	— —
Cow Bay	— —
Port Caledonia	— —
Little Glace Bay	— —

Freights.—JULY, 1870.

TO EASTERN PORTS.	From Philada.	From E. Port and Port Johnson.	From Newburg.	From Rondout.
Amesbury	$2 75	$— —	$	$
Bangor	2 75	— —	1 60	
Bath	2 00	2 00	— —	
Boston	2 60	1 63	2 00	1 75
Bridgeport	1 60	1 00	1 10	1 20
Bristol	2 00	1 25	1 40	
Cambridgeport	2 50	2 00		
Derby	2 00	— —		
Dighton	1 85	— —	1 45	
East Cambridge	2 50	2 00		
Fall River	1 75	1 25	1 40	
Hackensack	1 95	1 50		
Hartford	2 75	1 35		
Jersey City	1 75	50		
Middletown	— —	1 25		
Mystic	1 75	1 25	1 30	
New Bedford	1 75	1 40		
Newburyport	2 15	2 00		
New Haven	1 70	1 00	1 10	1 20
New London	2 00	1 15	1 25	1 30
Newport	1 75	1 25	1 40	
New York	1 25	50	70	
Norwalk	1 70	1 00	1 05	
Norwich and tow	1 70	1 35	1 35	1 40
Pawtucket	1 90	1 50	1 60	
Portland	2 00	1 75		
Portsmouth, N. H.	2 00	2 25		1 85
Providence	1 75	1 40	1 45	1 45
Rockport	2 10	— —		
Saco	2 30	2 10		
Sag Harbor	2 00	1 40	1 30	
Salem	2 00	1 60		1 75
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 75	2 00		
Warren	— —	1 40	1 45	
Washington	1 10			
TO RIVER PORTS.				
Albany		90	60	
Catskill		— —	50	
Cocksackie		— —	50	
Coeyman's		— —	75	
Cold Spring		— —	35	
Fishkill		— —	30	
Haverstraw		50	60	
Hudson		— —	50	
New York		— —	70	
Nyack		50	60	
Poughkeepsie		— —	35	
Rhinebeck		— —	30	
Rondout		— —	— —	
Saugerties		— —	40	
Sing Sing		— —	75	
Stuyvesant		— —	55	
Tarrytown		80	75	
Troy		90	75	
West Point		— —	35	
Yonkers		40	60	

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven,	$ 40
Bridgeport,	40
Southport,	40
Westport,	40
Norwalk,	40
Stamford,	40
	Per Boat.
Greenwich,	$70 00
Port Chester,	80 00
Mamaroneck,	70 00
Glen Cove,	— —
New Rochelle,	55 00
East Chester,	60 00
West Chester,	30 00
White Stone,	30 00
College Point,	25 00
West Farms,	25 00
Flushing,	30 00
Harlem and Mott Haven,	20 00
Port Morris,	20 00
Ninety-first street and Astoria,	16 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS.

Boats of 150—250 Tons.	Per Ton.
To Manhattanville,	8 cents
Spuyten Duyvil,	8 "
Yonkers,	9 "
Hastings,	10 "
Piermont,	12 "
Dobbs' Ferry,	12 "
Nyack,	14 "
Tarrytown,	15 "
Sing Sing,	16 "
Croton Landing,	17 "
Haverstraw,	17 "
Verplanck's,	17 "
Peekskill,	18 "
West Point,	20 "
Cold Spring,	20 "
Newburgh,	18 "
Poughkeepsie,	22 "
Rondout,	23 "
Boats of 100 Tons	Per Boat.
To Manhattanville, and Return,	$11 00
Spuyten Duvvil, "	13 00
Yonkers, "	15 00
Sing Sing, "	20 00
Peekskill, "	25 00

METALS.

NEW YORK, July 22, 1870.

IRON.—Duty: Bars, 1 to 1¼ cents ₱ lb: Railroad, 70 cents ₱ 100 lbs.; Boiler and Plate, 1½ cents ₱ lb; Sheet, Band, Hoop, and Scroll, 1¾ to 1¾ cents ₱ lb; Pig, 9 ₱ ton; Polished Sheet, 3 cents ₱ lb.

	Store Prices.
Pig, Scotch No. 1, ₱ ton	32 00@36 00
Pig, American, No. 1	32 00@33 —
Pig, American, No. 2	30 —@31 —
Pig, American, Forge	29 —@30 —
Bar, Refined, English and American	—@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash
Bar, Swedes, ord'y sizes, less 5 ₱ ct.	1 10@ — —
Bar, Refined, " "	80 —@ 85 00
Bar, Common " "	72 00@ 80 00
Scroll " "	97 50@130 —
Ovals and half-round " "	100 —@125 —
Band " "	95 —@ — —
Horse Shoe " "	95 —@ — —
Rods, ⅜ to 3-16 inch " "	85 —@120 —
Hoop " "	105 —@150 —
Nail rod, less 5 ₱ ct.	— 7 @—7½
Sheet, Russia, as to Nos. (gold)	— 11¾@—11½
Sheet, Single, D, and T Common	— 4¾@— 5¾
Sheet, Galv'd, Nos. 14 to 26 12 and 14c. Nos. 27, 28, and 26, 15 16c. and 18 13@15c. off.	
Rails, English (gold), ₱ ton	59 00 @60 00
Rails, American, at Works in Pa.	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ₱ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ₱ lb; over 11 cents, 2½ cents ₱ lb, and 10 ₱ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ₱ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— — @— 18
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ₱ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ₱ lb	— @— 30
Copper Bolts	— @— 30
Copper Braziers, 16oz. and over	— @— 30
Copper Nails	35 @— 36
Copper, Old Sheathing, &c., clean	— @— 17
Copper, Chili Pig	— @— —
Copper, American Ingot	19¾@— 20½
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ₱ 100 lbs.; old Lead, 1½ cents ₱ lb; Pipe and Sheet, 2¾ cents ₱ lb.

Galena, ₱ 100 lbs	$— @— —
Spanish (gold)	6 25 @6 27½
German, do.	6 25 @6 40
English, do.	6 25 @6 45
Bar (net)	— — @8 00
Pipe and Sheet (net)	— — @8 00

TIN.—Duty: Pig, Bars, and Blocks, 15 ₱ cent. ad val.; Plate and Sheets and Terne Plates, 25 ₱ cent. ad val.

	Gold ₱ lb.
Banca	37¾@38
Straits	37¾@38
English	34 @—

PLATES.

	Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ₱ box	$8 75 @9 —	$10 75	@11 25
I. C. Coke	7 — @7 75	8 75	@ 9 75
Coke Terne	6 — @6 25	7 50	@ 7 75
Charcoal Terne	7 75 @8 25	9 50	@10 25

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ₱ 100

		Gold.
Plates, Foreign	₱ 100 lbs.	$6 75½@6 50 0
Plates, Domestic	₱ lb.	07 @- 10½

REMARKS.

IRON.—The demand for Scotch Pig continues light, but owing to the advance in the gold premium, prices are a shade firmer; we have only to notice a sale of 50 tons Glengarnock at $34, 4 months. The inquiry for American is still confined to small parcels, but prices are unchanged; 300 tons Thomas Gray forge sold at $28; 300 tons Glendon, do. and 500 do. No. 2 Carbon, on private terms. Rails are in moderate request at $59 @ $60 gold for English, and $70 @ $71 currency for American, at the works in Pennsylvania. The makers of Refined Bar have advanced their price to $82 50 in Philadelphia, equal to $85 here in store. The price in Liverpool has also advanced 5s., being now quoted £8 there, costing $82 laid down here. From store, prices have been largely advanced, though Bar is hardly yet up to cost of new importations. We quote: Refined Bar, $80 @ $85; Common do., $75 @80; Scroll, $97 50 @ $130; Ovals and Half round, $100 @ $125, and Hoop, $105 @ 150, currency. Band, Horse Shoe, Rods, ⅜ @ 3-16 inch. Nail Rod and Common Sheet has not changed. Russia Sheet has been stirred a little, but we know of no sales.

LEAD.—The apprehension of an interruption in the supplies of Foreign Pig, owing to the war rumors, causes more inquiry, and, with considerable business, prices are a little higher. Sales have been made of 100 tons Spanish, ex ship, at $6 25; 50 do. from store, $6 27½ gold; and 250 do. to arrive, at a private price. Bar, Pipe and Sheet have advanced to 8 cents net cash.

COPPER.—New Sheathing is steady at 30 cents, and Yellow Metal 22c. cash. For Ingot there is a little more inquiry, and prices are rather in sellers' favor, ⅛ @ ¼ cent advance over previous quotations being generally demanded. Sales have been made of 125,000 lb. Lake have been made at 20⅜ @ 20½c.; 50,000 lb. Tennessee, 20¼c.; and 100,000 lb. Baltimore, 20¼c. cash.

TIN.—Pig remains very quiet, but prices are without quotable change; sales have been made of 200 slabs Malacca at 38 cents; a small lot Straits, 37¾c.; 50 slabs Banca, 39c.; and 15 tons English, 34c., part 60 days, all gold. In Plates, there has been rather more business at steady gold prices and higher currency rates; we notice sales of 250 bxs. I. C. Coke Tin, 14 by 20, at $7 75; 500 do., $7 50; 600 do. Charcoal Terne, about $7 75, all gold; and 1,000 bxs. I. C. Coke Tin, 14 by 20, on private terms.

SPELTER.—There has been quite an active speculative demand for Foreign, and a further advance has been established, the market closing at 6⅞ cents, gold, for Veille Montague, and 6½c. for Stolberg and Silesian. The sales embrace 550 tons at 6¼ @ 6⅜c., according to brand. Missouri is in fair request at 7c. currency.

STEEL.—Is in fair demand and steady at our quotations, though the tendency is upward with gold —50 tons old Cast sold on private terms.

ZINC.—Sheet has been in demand, and all the Mosselmann in Agents' hands, on the spot and to arrive, has been taken, with considerable from importers' hands, the market closing higher, with still an upward tendency. The sales foot up 700 casks, including 400 Mosselmann at 8¼c., less 4 ₱ cent. gold, and 300 casks foreign to arrive, on private terms—from store 10 @ 10¼c. currency is the price. American is also unsettled and higher, but there have been few transactions.

ZINC.—American Ox. Zinc, 6½ @ 7c. French do., 10 @ 10½c.

MANGANESE.—4 @ 4½c.

Mining Stocks.

NEW YORK, July 22, 1870.

Prices are unsteady, with a downward tendency. Consolidated Gregory is now offered at 70 @ 75c., and sales in Grass Valley are made at 40c. Central is firm, selling at 38c, and Black Hawk stronger at 30c. Mariposa appears to be in trouble again. The stock is now offered at 6c. for Common, and 11½ @ 12c. for Preferred. There seems to be something radically wrong in the management of the mines of this company.

Petroleum stocks continue quite strong. Sales of Rynd Farm are reported at 32c. Following is the Stock Exchange list of quotations:

	Bid.	Asked.
Bennehoff	—	40
Bergen Coal and Oil	40	50
Bliven Oil	40	—
Blood Farm	50	—
Brevoort	1 00	—
Buchanan Farm	45	50
Centrus	63	—
Clinton	—	—
Home Petroleum	—	3 00
National	25	—
N. Y. & Alleghany	2 00	—
Northern Light	50	75
Pithole Creek	—	1 50
Phillips	12	25
Rathbone	—	40
Rynd Farm	—	35
Second National	—	75
Tar Farm	20	—
United Petroleum Farms	22	—
United States	75	—

San Francisco Stock Market.

We have the following list of quotations by telegraph from San Francisco, bearing date July 21.

Savage	34¼	Gould & Curry	59
Yellow Jacket	26¾	Belcher	No sales.
Kentucky	No sales	Imperial	39
Chollar Potosi	27	Amador	No sales.

The Slate Trade.

NEW YORK, July 15, 1870.

[Corrected weekly.]

PRICES OF ROOFING SLATE.

(A "square" represents 100 superficial feet.)

Vermont purple, 1st quality, per square		$9 50@10 50	
" green, 1st "	"	9 50@10 50	
" red, 1st "	"	15 00@16 00	
" variegated,	"	8 50 @ 9 50	
Pa, b'k and d'k blue, 1st qual.,	"	7 00@ 8 00	

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending July 16, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Jones & Williams	105 squares.
Lehigh Slate Co.	35 "
Saylor & Morgan	35 "
Kuntz & Woodring	70 "
Girard Slate Co.	70 "
D. Thomas	35 "
Locke Slate Co.	105 "
American "	35 "
Hope " "	70 "
Columbia " "	35 "
Total	490 "

SCHOOL SLATES.

D. Williams	.. cases.
Locke Slate Co.	4 "
Total	83

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Eagle Slate Co.	140 squares.
Continental	35 "
Thos. W. Parry	175 "
Twin City Slate Co	35 "
J. J. Thomas	35 "
Heimbach Slate Co.	70 "
Twin City	35 "
National	35 "
H. Williams	35 "
T. Beck & Co.	35 "
R. R. Carter	35 "
Total	560 "

LEHIGH CANAL.

SCHOOL SLATES.

A. W. Lerch	30 "
H. U. Harper	32 "

	Week.	Previously.	Total for Year.
L. and S. R. R.	560	3,869	4,429
L. V. R. R.	490	10,055	10,545
Lehigh Canal	..	762	762
Total	1 050	14,686	15,736

Commodious Piers and Longitudinal Transit.

THE Commission having in charge the subject of docks and piers has held a number of sessions during the past week, and has already had under consideration several plans of various degrees of merit for the accomplishment of the object which lies so near the heart of every well-wisher of our city. The pride of the New Yorker has received ample gratification during the last quarter of a century, in the rapid strides that have been made by this representative city of the New World in that race of metropolitan civilization which brings her into comparison with the great capitals of Europe. In the width and other convenience of her great thoroughfares, in the purity and splendor of her public and domestic architecture, in the extent and beauty of her parks and cemeteries, she already takes her place among the most attractive cities in either hemisphere. In those parts alone which strike the eye of the voyager who, allured by the reports of her comeliness, visits her from abroad, in the arrangements made for the accommodation of that mighty commerce which brings her into alliance with all the nations of the earth, she presents an aspect of inconvenience and deformity which places her far behind her transatlantic rivals. The margins of the beautiful river that flow on either side of her, instead of contributing to her advancement, are allowed to become repulsive; and New York might be likened to a rich and costly scarf with dirty and ragged fringes.

Now, it is one of the boasts of the advocate of strong and concentrated governments, that works of great public importance are done under their auspices effectively and promptly, when they are required. If an enlightened monarch, or his ministers, see that a city of the empire is in need of docks or any other improvements, the decree creating them goes forth at once, and the people have no further care in the premises than to foot the bills. But, not to dwell upon the compensatory evils that attend this summary efficiency, there are two advantages which we may venture to claim for the slower republican process of accomplishing the same end by the voluntary co-operstion of the people. The first is the education acquired by the people themselves in learning their own wants and how to supply them; the other arises from that very tardiness of movement which is urged as their reproach. When they do at last arouse to the work, they bring to it a ripened intelligence and a generous emulation, which will be satisfied with nothing less than improvement on all that has gone before. We might have said that the slowness of the citizens of New York to attend to the condition of their docks was shameful, but everybody knew that they *would* attend to it when they were ready; and now that the time has come, no one doubts that the subject will be taken up in such a spirit as to place us, in this important respect, by the side of the great maritime cities of the world.

It is, of course, no part of our purpose to assume the office of this Commission, and pronounce upon that particular form of the work which is best adapted to our circumstances or our needs. The cyclopean docks of Liverpool and London may not be necessary where the tides do not run so high as in the Mersey and the Thames; the splendid embankments of the latter river, with their architectural adornments and their promenade gardens, may not be compatible with our sterner utilitarian necessities; and so, many another monument of foreign form and skill, admirable in its place, may not be proper to transplant. All this we are willing to leave in the hands to which it has been committed. We only desire to call attention to one other consideration bearing upon the subject, besides that of commercial accommodation. Hitherto the great question of a swift and unembarrassed transit from one extreme of our narrow island to the other has been discussed only in its relation to the exigencies of the land, and one would think, from the arguments on the subject, that there was no other way of getting to Harlem or Manhattanville, but right through the middle of the town. But once remove the obstacles of filthy, crowded, rotten, dangerous, and inconvenient wharves, which have hitherto rendered river-navigation, by swift and commodious steamers, impossible, and give us instead, clean piers and safe and unobstructed landings, with the large and pleasant access to them which makes it so easy to board the little craft that ply up and down the Thames, and we shall soon see a transit business upon our two noble rivers which will relieve the graver question of transportation by land of many of its difficulties. The great pecuniary success of the present line of Harlem boats indicates the profitable nature of such a business, systematically extended, with landings along both water fronts at convenient distances, connected at the wider parts of the island with cross-town railroads.—*N. Y. Star.*

Broken Axles.

IN the late annual report of L. J. FLEMING, Chief Engineer and Superintendent of the Mobile and Ohio Railroad, after saying that accidents from defects in machinery, except from broken axles, had diminished, the following remarks on the causes and prevention of broken axles are given:

"The accidents from broken axles, principally under tenders, may be ascribed to two causes—the granulating effect of the heavy, rigid rail when laminated, and the very bad quality of metal of which axles are frequently made. Manufactures generally believe there is no method of testing the quality without breaking the axle, and when accidents occur, that they will be attributed to the effects of granulation from vibration and impact; and that there is no means of tracing them to the bad metal of which they are made. For some time past all new axles have been ordered of sufficient length to take a fracture from each end, and one or two of each lot has also been broken in the centre. The result of these tests has been to return to the makers three-fourths of those ordered within the past year. In future orders, the names of the makers will be required on each one, and the proper credit or blame will be given in the annual reports. The person who manufactures a bad axle, on which the lives of so many passengers depend, whether it is done intentionally or from the want of a proper knowledge of making it, is as culpable as the person who places an obstruction on the track to throw off the trains."

Miscellanea.

APPLICATION OF MICA AS A SUBSTITUTE FOR BRONZE.—A means has been found of greatly increasing the value of mica, by converting it into a coloring material. The mica is reduced to small pieces in a stamping mill, digested with chlorhydric acid, cleansed by washing, and sorted by sieves into sizes. The mica scales so prepared, have a beautiful vitreous lustre, a silvery appearance, and bear in commerce the name of Brocade Crystal Colors, or Mica Bronzes. The advantage of these brocades over the common metallic ones are: 1. They contain no unwholesome substance. 2. They possess a metallic lustre like the metallic brocades, and much surpass them in splendor. 3. Brown, blue, black, green, and red colors of rare brilliancy can be obtained, which is not the case with the metallic brocades. 4. They are not dimmed by sulphur vapors. The analyses by Drs. CECH and SCHNEIDER show that the coloring matter of the rose-brocade is cochineal; that of carmine is fuchsine; bright red, fuchsine and Havana brown; violet, Hoffmann's violet; bright blue, Berlin blue: dark blue, probably impure aniline blue or Girard's violet; light and dark green, a mixture of aniline blue and curcuma; gold, curcuma; silver, the mica alone, etc.—*Journ. fur Prakt. Chemie.*

Steam Boiler Explosions.

The Select Committee appointed to inquire into the cause and remedy of boiler explosions, in England, have examined several engineers with a view to recommending some policy to the general government with reference to this important subject.

From the *Colliery Guardian* we take the following report of the examination of Mr. FLETCHER, the engineer of the Manchester Steam Users' Association. He said that he had had great experience, and paid much attention to the subject of steam boiler explosions since 1861, and had reported on them to the Association. Steam boiler explosions were both frequent and fatal. On one occasion as many as twenty ; in a second thirteen, and in a third, the same number, were killed. The explosions took place at Masborough at Bilston. A further explosion in 1864 killed twelve persons, at some ironworks at West Bromwich, and a very disastrous one occurred last year at Bingley. The witness handed in photographs of the effects of all these explosions. He handed in also a tabulated statement of twenty boiler explosions this year, killing forty-four persons. From 1864 to the present time there had been no less than 595 steam-boiler explosions, killing 903 persons and injuring 1,114. The number of persons killed by boiler explosions in each year exceeded those killed on all the railways by three times, and there was no reason to suppose they were on the decrease. The mischief done by the explosions very frequently extended beyond the works in which they occurred, and he produced a photograph of a case at Blackburn, in which a young woman standing in her own cottage near the works was scalded to death by a jet of steam ; and in a case at Oldham, a house let out in tenements was greatly injured. He had numerous instances in which persons had been killed or property injured outside the works in which the explosion occurred. A large number of cases had come under his own personal observation. The steam-boiler explosions are from the simplest cause, either because the boiler was badly constructed, or worn out, or improperly used. Boiler-minders were very often unjustly accused, where the boiler-maker and master were in fault. In point of fact, where the boiler-minder was the cause of one explosion, the boiler-maker and master were responsible for six, Out of fifty-eight explosions which occurred last year, no less than twenty-six were attributable to the malconstruction of the boiler. From January, 1861, to June 17, 1870, there had been 411 boiler explosions, killing 659 persons and injuring 781 The causes of 297 of those explosions had been ascertained, and it had been found that 120 were due to malconstruction of boilers ; eighty-eight from defective condition of the boilers ; forty-four from the failure of the bottom of the boilers externally ; thirty-eight to the condition of the plates ; and thirty-eight to the shortness of water. He explained that the malconstruction arose from the want of certain seams, hooks and rings. He also mentioned that a great many explosions had occurred in the Cornish boilers (which when made and looked after were the safest in the world, and never burst), in consequence of the obstinacy of the boiler-makers, who refused to strengthen them with rings where the man-hole was cut through ; and in Lancashire a large proportion of the boilers which burst were constructed on the Cornish principle. Among other causes of boiler explosion he also mentioned defective safety-valves, and stated that in one instance a turn of the screw added sixty pounds to the pressure, and there was only a thin thread between life and death. Another cause of boiler explosions was corrosion, both externally and internally, and that very often arose from the improper setting of the boiler. The witness produced several iron plates in which the boilers had exploded from corrosion ; in fact the whole room was full of ruptured boiler plates, ends of boilers, models, books on and photographs of every conceivable kind of boiler explosion; and the proceedings of the committee resembled those of a learned society engaged in a philosophical investigation rather than that of a parliamentary committee.

The witness stated that our explosions had resulted from the most inefficient mode of repairing, and referred the committee to one specimen in the room in which the patches, or rather plasters, as he termed them, were put on in the most extraordinary way. That was at a place called Breakdown. The patched part of the boiler was covered with brickwork, and the patches could not be discovered till after it had burst. It was only inspected by the stoker. The verdict of the jury in that case was "That the accident arose from the boiler being worked in an unsafe condition, and not on account of any want of skill by the engineer." Had that boiler been under the inspection of the Manchester Association, it would not have been allowed to be used. He next produced the model of the steam boiler which recently exploded at Chatham Dockyard, which was from external corrosion, and proceeded to exhibit a whole host of photographs of boiler explosions in different parts of the manufacturing districts from 1867 to the present time, some of which were attended with the most destructive effects, involving the destruction of the whole house. He considered that explosions arose from known causes that might be grappled with, simply by competent inspection from the time they were turned out of the maker's yard, and that none should be set without it had been previously tested. He would have one thorough inspection of every boiler while at rest once a year, besides a periodical inspection of a less searching character. He believed that such an inspection would lead to saving many lives, and he mentioned that their Association inspectors had frequently discovered boilers to be in a condition when they must have been on the very eve of exploding. In one case the inspector knocked a hole through a plate which was only about one-sixteenth of an inch thick, while in other cases the boilers were corroded to a most dangerous extent. He had been connected with the Association for nine and a half years, and only one explosion had taken place in the boilers under their inspection, and that from the over-heating of the furnace crown of the boiler in consequence of the injudicious use of boiler composition ; but the boiler was not disturbed from its bed, nor was anyone injured. The Association had frequently warned the subscribers of the danger of over-dosing their boilers with composition to prevent their corroding in consequence of their tendency to form deposits. In four other cases boilers had burst which had not been tested by the Association, and for which they were not responsible. The Association only guaranteed boilers of which they approved, and while they had only one explosion during five and a half years, there had been hundreds outside. He thought 100,000 would be a fair estimate of all the boilers in the kingdom, and he felt persuaded that if proper care were used steam boiler explosions might be put an end to altogether.

With regard to the enforcement of a system of inspection, he should much rather see voluntary than compulsory inspection ; but he had arrived at the conclusion that, so great was the loss of life, that a compulsory system was required. Not more than one in five were now inspected. He suggested that there should be a central board of inspection, consisting of about forty members, half of whom should consist of owners of boilers and half of scientific men, such as engineers, boiler-makers, and others. To this body, Government should delegate the power of inspection. The board, he suggested, should be elected by steam boiler owners. The central board should appoint the inspectors, and send them to various districts. The administration should be central, but the representation should be local. Each locality would elect one or more representatives to the central board. If it were worked from local centres, there would be too great a variety of opinion. Boiler-making was a science of a progressive character, and a boiler which might be safe in one locality, worked in a particular way, would not be in another, worked in another way. He suggested that particular towns should constitute the headquarters of various centres. Thus, Newcastle might represent the manufacturers there and to the north, and Manchester and Leeds represent the cotton and woollen centres. The central board should be a national one. It should be an honorary board. The engineering talent of the highest character would be on that board, and it would be an honor to any one to be on it. He wished to see a national board elected from local centres. He had no doubt that people would serve on that board merely for the honor, and the position would be sought for. He did not see that the work would be of an onerous character. In every boiler under their inspection, he believed, explosion would be practically unknown. He was not of opinion that local boards would work satisfactorily. He was sure that local boards would always be conflicting one with the other. The Cornish board would contradict the Lancashire board, and the Lancashire the Cornish.

In reply to Dr. PLAYFAIR, the witness said that his plan was something after the nature of the plan adopted in regard to the medical profession—a central board, all steam users contributing according to the number of their boilers, but no local boards—only officers with a general compulsory inspection, through inspectors appointed by the general board.

[No other country in the world, in all probability, suffers as much from boiler explosions as our own. If some systematic and general plan of inspection was undertaken in this country, we might avoid many disastrous and fatal catastrophies of this nature.—ED.]

The Columbia College School of Mines.

We extract from the annual report of President BARNARD, the following article on the School of Mines. The report is able and voluminous, giving statistics of the attendance of all the principal colleges in the country, and also tables showing the ratio of students to the population in the New England States from the year 1826 :

The School of Mines has been, during the last year, essentially strengthened in its power of usefulness, by the enlargement of the scope of its teaching, and by the addition, to its academic staff, of instructors specially qualified to teach the French and German languages. The school now offers to the choice of all who desire thorough scientific instruction, five distinct and parallel courses, consisting of—1. Mining engineering ; 2. Civil engineering ; 3. Metallurgy ; 4. Geology and natural history ; 5. Analytical and applied chemistry. To any who desire to pursue only a single branch of science, or a course of general science, embracing any number of branches selected at pleasure, its doors are also open.

The course of civil engineering has not been hitherto given. Provision has been made for it in future years, by assigning the duty of instructing in this department to Professor VINTON. Actual instruction will commence at the opening of the ensuing session.

Large and important additions have been made during the present year to the mineralogical and metallurgical collections, and to the library. Some of the most valuable of these have been donations from generous friends of the school, some from alumni, who, while travelling in Europe, or while engaged in mining or metallurgic operations at home, have not failed to carry with them a loyal affection for the institution, to which they feel themselves to have been so highly indebted ; and some have proceeded from foreign schools, with which we are in correspondence, or from foreign governments, which have been moved to bestow upon us so honorable notice by the directors of their own national institutions of like title and grade as ours. On our part, we have been and we still are constantly reciprocating these favors, by sending abroad the most valuable works published in this country on American geology and natural history, and also such specimens of minerals and rocks as are peculiar to our country, and have the largest interest to our correspondents abroad.

The collection in geology, one of the largest and most complete in the United States, and in some of its departments positively unequalled in respect to fullness and to the number, magnitude and value of its representative specimens, is not the property of the school. It is the visible record of the life's labor of the estimable and accomplished professor, who so ably fills the geological chair, by whose hands a large portion of its most beautiful and perfect specimens were gathered from their native beds, in the progress of explorations prosecuted by him in the public service, over a territory embracing some hundreds of thousands of square miles. The collection has also been largely extended and enriched by the exchange of some of the accumulated fruits of personal labor for other specimens drawn from localities still more widely scattered over the earth's surface. And in order that nothing might be wanting to its completeness, its possessor has added, by direct purchase, many objects of great interest, among which may be mentioned here, as they are the objects which most immediately arrest the attention of the stranger who enters the cabinet, the admirable casts by WARD of the skeletons of extinct monsters ; casts of which the value has since become materially enhanced, by the deplorable loss, at the Rochester University, of the original moulds by fire. Many considerations combine to indicate the desirability that this collection, the scattering of which—an occurrence which unforeseen events might necessitate—would be a serious loss to science, no less than to the school, should find its permanent home here. Some means, it is greatly to be hoped, may be devised by which this important acquisition may be secured.

Many of the friends of the school, not directly connected with it, nor with the college, and also the professors engaged in giving instruction in the school itself, have long entertained the opinion that its prosperity would be essentially promoted if it could be transferred to a location in more convenient proximity to the great business centres of the city. The subject has also occupied the attention of this Board ; and, in point of fact, a committee of trustees was appointed, several months since, with instructions to inquire into the practicability of effecting such a transfer. This committee has not been inattentive to the duty assigned it. It has deliberated seriously upon many propositions. As yet, however, it has not been able to arrive at any conclusion sufficiently mature to be submitted to the Board, and the subject is not, therefore, one on which it would be quite in order to enlarge here.

The question has also presented itself, whether, considering the large expansion which has been given to the teaching of the school, its title ought not to be in some manner modified, so as to be made expressive of the enlargement of its scope. In the beginning, its aim was to be a School of Mines, and nothing more ; but to be a school so thorough in its own department as to leave nothing to be desired. That object having been satisfactorily provided for, it has become a school of civil engineering, of geodesy, of natural history, and of general science. The title by which it is now known fails to convey all this, or rather seems to convey the implication that all this is not true ; and hence this title is presumed by some to prejudice the general prosperity of the school, though it may advance it in its own original speciality. It is worth consideration, whether, without dropping the present designation of the school, some addition might not be made to it, which should correspond to the more general work which the school now so successfully performs.

The Georgia Gold Region.

A CORRESPONDENT informs us that he has for some time past been engaged in testing property situated on Yohoola creek, one mile east of Dahlonega, where he now has a fine stamp mill in operation. He writes : My operations on Cavender's creek I was obliged to abandon on account of lack of the necessary water to run my mill steadily. I now have a good mine and excellent water power, and expect to do a pretty fair business whenever I am able to add five more stamps. Our ore is in general of a low grade, yielding from one to two dollars per ton, by the mill process ; but as we can mine and mill those ores at from 25 to 30 cents per ton,* it leaves a pretty fair margin. My first week's work of five days resulted in 85 dwts. of amalgam, and last week's run of six days, in 152 dwts. When I have the mine fairly opened and am a little more at leisure, I will give you a full account of my operations for the Yahoola and Georgia Gold companies, both situated on Yahoola creek. It is certain that this section has an abundance of low grade ore, which, by judicious management, pay a handsome profit, and that low grade ores form the basis of permanent mining, is an indisputable fact.

I learn to-day that the Yahoola Company will probably stop work for a while on account of a pending law-suit between the stockholders. That company has been doing better of late than at any other time since its origin. They have an immense body of ore, a fine twenty-stamp mill with double discharge, and can mine and deliver the ore to the mill so cheaply that 75 cent. ore will pay a good profit.

Department of Docks.

THE Dock Commissioners met on June 21, at 2 P. M., when Mr. WOOD, Chairman of the Auditing Committee, presented 16 bills, amounting in all to $16,025 26. The bills were for work done on the different docks, and were all accepted.

Several communications and petitions were received from private parties with reference to the present condition of some of the piers and slips, and were referred to committees. A communicatfon was also received from Mayor HALL, recommending certain repairs to the amount of $51,000, which was not acted upon.

* This seems to be incredibly cheap work.—[ED.]

THE ENGINEERING AND MINING JOURNAL.

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ROSSITER W. RAYMOND, Ph. D., Editor.

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The Department of Docks.

PLANS, suggestions and petitions continue to pour in upon the Commissioners of Docks, and it is clear enough that nothing important can be finally decided until the Commissioners can have the constant, competent and impartial counsel of some regularly employed expert, who shall separate this vast mass of material into the absurd and impracticable, the doubtful, and the feasible and advisable, and who shall vindicate his opinion subsequently by actually carrying out the constructions he recommends.

The first necessary step towards such a sifting and final decision has been taken in the appointment of General GEORGE B. MCCLELLAN as Engineer-in-Chief of the Department of Docks. General MCCLELLAN is personally and politically popular with the overwhelming majority of the citizens of New York; and this cause alone would render his appointment generally satisfactory. But there is no doubt that his skill and experience as an engineer also warrant the choice of the Commissioners. A great deal has been written and said on both sides as to his military career; and his ability as a commander has been discussed with so much passion and prejudice that an impartial judgment upon it was impossible. We think the general tendency of public opinion, as facts grow clearer and feelings cooler, with the lapse of time, is towards a higher appreciation of his power, on the one hand, and of the difficulties which encompassed its exercise, on the other. Still, that has nothing to do with his present position and duties. The significant fact remains, that not even his enemies have questioned his eminence as an engineer. Concerning his triumphs in this line, both in the army and out of it, there has been but one verdict. His writings, his expeditions, his career as a railway manager and engineer, all prove his scientific and practical abilities.

Our readers will remember that General MCCLELLAN was appointed by the will of the late EDWIN STEVENS to superintend the completion of the celebrated STEVENS battery in Hoboken. The progress of this work has been kept secret; but it is generally believed that the battery can now at any time be launched in a few hours, and put immediately in readiness to defend the harbor of New York, for which purpose it was intended. Of course it would not be advisable to expose its peculiarities to public observation until it becomes necessary to use it. May that time be far distant. In fact, nothing could be more satisfactory to the merchants of New York than the peaceful, undisturbed decay of the STEVENS battery. Meanwhile, its distinguished Chief Engineer is called to superintend a work of far more immediate, important and permanent bearing upon our metropolitan commerce. Instead of a floating fortress for its defence, he has to devise and construct docks and piers for its accommodation — facilities without which it is crippled almost as seriously as by the guns of an invading foe. Much has been done in many ways to protect our harbor; let us now see something done to improve it. While we are devising means of defending our commerce, let us not forget the necessity of maintaining and increasing it. In this great and necessary undertaking, we look with confidence to General MCCLELLAN, trusting that he will give us a wise and thorough plan, wisely and thoroughly executed.

The Advance of Natural Science.

IN the steam and railroad age in which we live, we are sometimes apt to regard the discoveries made a century ago with less consideration than is really their due. Though we may not actually join with MARK TWAIN, in regarding BENJAMIN FRANKLIN as an old fellow who flew a kite, because he was too lazy to work, and in order to make a pretence of doing something, tied a key to the tail and pretended to be fishing for lighting; still it sometimes seems that if the old philosophers lived in our day, we could show many living scientific men who would surpass them in qualities necessary for scientific experiment, the ability of close reasoning and the interpretation and application of mere scraps of knowledge. It is true that some of our formerly cherished theories have been rudely blasted by recent scientific discoveries, while on the other hand, we frequently find that the most careful and accurate researches of the present day confirm theories, which were advanced by philosophers of the last century. The most striking example of this kind, which has recently come under our notice, is the confirmation by SECCHI, in 1867, and more recently by LOCKYER and JAUNSEN, of the theory advanced nearly a century ago by Sir WILLIAM HERSCHEL, with regard to the condition of the solar photosphere. The observations of LOCKYER and JAUNSEN were made during the great solar-eclipse, of August, 1868, by the aid of the spectroscope, entirely independently of each other. These observations showed that the prominences observed on the disk of the sun during a total eclipse, are masses of vapor, principally hydrogen, which envelop the body of the sun and glow from their intense heat. Father SECCHI, of the Collegio Romano, in 1867, thus alludes to this envelop, the existence of which he was the first to recognize: "The observation of eclipses furnishes indisputable evidence that the sun is really surrounded by a layer of red matter, of which we ordinarily see no more than the most elevated points." JAUNSEN and LOCKYER have since shown, that these prominences can be recognized when the sun is not eclipsed, and the latter observer gave to the red envelop the name "chromosphere." The prominences are, in many respects, very similar to our clouds, but while the temperature of our earth is so low as only to allow the formation of aqueous clouds, that of the sun is so high that in its atmosphere clouds of iron, copper, zinc, and other such elements may, in all probability, exist. Mr. LOCKYER describes these glowing vapors as stirred, from time to time, by fierce tempests, and he has succeeded in measuring roughly the velocity of these solar winds.

Sir WILLIAM HERSCHEL recognized in the solar photosphere a widely extended layer of luminous clouds, while he regarded the light of the penumbræ of sun-spots as coming from a lower cloud-layer. He conceived that up-rushes of vapor, thrusting aside both layers, caused the appearance of a solar spot. We have heard a great deal lately of the English and continental theories of the solar constitution; but the evidence we have recently obtained goes far to show that, after all, Sir WILLIAM HERSCHEL, without the aid of spectroscope or polariscope, formed a juster view of the solar constitution than any which has been recently propounded. He was doubtless mistaken in the view (which he put forward as a mere hypothesis) that the real surface of the sun may be not very intensely heated. We have every reason to believe that the whole mass of the sun is raised to an inconceivable degree of heat. But for the rest, there seems far more reason to believe in Sir WILLIAM HERSCHEL'S cloud-layer theory than in any other which has been put forward in recent times. Thus when we come to consider the lack of the requisite instruments for making solar observations in his time, we begin to appreciate the probability that had these instruments been known, he might have made much more important discoveries than any which have rewarded the labors of the scientific men of our generation.

The Nicaragua Route for a Ship Canal.

IN a former number we published a paper read before the American Society of Civil Engineers, on a ship-canal across the Isthmus of Panama. The question of a connection by canal of the Pacific Ocean and the Gulf of Mexico has been kept before the public for many years, and has now, after the successful completion of the Suez Canal, and the consequent reduction of distances to the East Indies and Eastern Asia, assumed higher importance than ever before. Many of the best American and English engineers have spent the labors of years in the solution of the problem, to find the best suited route; but still the opinions of engineers are as much divided as ever. We publish to-day the excellent report of Col. O. W. CHILDS, C. E., on the Nicaragua route, and invite the attention of our readers to the document.

Our System of Military Bridges.

THE safe and rapid passage of rivers in the field is one of the most important and delicate of military operations. Instances might be easily cited, not only in our late war, but in many others, where, through the absence of a proper ponton train, the most brilliant opportunities have been lost.

Our own system of military bridges is not a superficial and sudden creation. It is the result of careful study, patient and long-continued experiments, and great experience in the field. In December, 1868, the Chief of Engineers of the United States Army organized a Board for the purpose of improving and revising the bridge-system. This Board was composed of officers of long and distinguished connection with the Engineer service; and the result of their labors is now isssued, under authority of the Secretary of War, as the approved system of drill and instruction for the line of the United States Engineers. The book is accompanied by an atlas, containing a large number of working drawings, sufficiently in detail to serve for the construction of the complete train.

In order to give an idea of the system adopted, and the reason which induced the Board to recommend it, we select from the report a few facts concerning the bridge-train and its history. Previous to the Mexican War no attempt was made to organize a bridge-equipage in our service. During this war two complete trains of India-rubber pontons were constructed and sent into the field. At its close, those trains were sent to West Point, where they were used for the instruction of cadets and engineer troops. A full description of this equipage is given in the "Professional Papers, Corps of Engineers, No. 4."

It soon became evident that India rubber is not at all adapted to the construction of pontons.

First. From the perishable nature of the material. The cylinders are formed of alternate layers of canvas and India rubber. The sulphur used in the process of vulcanization generates sulphuric acid, which soon destroys the fabric of the cloth.

Second. The extreme elasticity of this species of support gives to the bridge a rocking and oscillating motion, so violent as to render it unsafe for the passage of animals.

Third. The most serious objection, however, is that a puncture, either above or below the water-line, is equally fatal to the cylinder. Hence, a single sharpshooter, from a rifle-pit on the enemy's side of the stream, can destroy these pontons as fast as they are launched.

In the autumn of 1858, the India-rubber pontons having become entirely unserviceable, experiments were made to determine the composition of a bridge-equipage that should be adapted to our service. In conducting these experiments, the following fundamental rules were kept constantly in view:

First. The mobility of the train must be such as to enable it to keep pace with all the movements of the column to which it is attached.

Second. The train should furnish the means of ferrying troops promptly and safely, as in the case of disembarkations, and the passage of a river by force.

Third. It should furnish the means of constructing a bridge capable of passing an army with all its trains over the largest and most rapid rivers, with safety and without delay.

Now, under the most favorable circumstances, it is very difficult to reconcile the first and third of these rules, when but one species of ponton is employed. In this country it is impossible. The immense trains with which our armies are unavoidably encumbered, the long marches to be made, and the numerous wide and rapid rivers to be crossed, demand an equipage of the most substantial character. On the other hand, the extended expeditions of light columns, which necessarily attend our military operations, require a train light enough to keep pace with the most rapid cavalry movements.

Hence we require both a reserve and an advance-guard train.

The experiments above named included the trial of samples of the bridge equipages used by those European armies most experienced in the art of military bridge building. Pontons were constructed after the models of the French bateau, the Austrian sectional ponton, and the Russian canvas-boat. Corrugated-iron boats were procured, corresponding as nearly in form and dimensions to the French and Austrian boats as the nature of the material would permit. A number of Birago trestles were also constructed. All of the above material, with the exception of the iron boats, was prepared by the enlisted men of Company A, Engineers.

The bridges formed of this varied material were exposed as much as possible to the action of heavy loads, storms, the tide and floating ice. The material was also packed on carriages of various patterns in order to ascertain the best form, both of bridge material and carriage, for transportation.

The selection of the French, Russian and Austrian trains for these experiments, was made after a careful study of the various equipages used at present by the armies of Europe. These three nations alone appeared to have definitely settled on their systems, and this after much experience and thorough research.

The Prussians and Spaniards were seeking for substitutes for their bridges, which had proved unsatisfactory. The Sardinians had adopted a plan inferior to that of the Austrians, though similar in some respects. The English tin ponton had too many of the defects of the India rubber to answer our purposes.

After experimenting for two years with the above-mentioned material, the following conclusions were reached: The French ponton is superior to the Austrian in simplicity and stiffness; as a ferry-boat, it will transport more troops, and is more easily managed; in the bridge, its superiority is marked. With the French equipage, the corresponding balks of the adjacent bays lap each other about six feet, and are finally lashed together and to both gunwales of the ponton, which greatly increases the strength and stiffness of the roadway; while with the Austrian, the balks must meet on a sill directly over the axis of the boat. The bays thus hinging on this side, full play is allowed to the horizontal and vertical oscillation to which floating bridges are subject.

As to land transportation, the French train requires fewer carriages to transport the same length of bridge than the Austrian, since for each section of the latter ponton, a separate vehicle is necessary. The length of the two carriages does not differ materially, this being determined by the length of the balks.

These considerations led to the adoption of the French ponton.

The next question was, what material should be employed in its construction? Life-boats having been successfully manufactured in this country out of corrugated iron, it was presumed that this material could be used with equal advantage in the present case. The first boat, made of the same thickness of metal as the largest class life-boat, proved to be deficient in stiffness when placed in the bridge. The corrugations,

running from bow to stern, diminished the power of the sides to resist the vertical strain caused by the weight of the roadway on the gunwales. To remedy this defect it was proposed to line the boat amidships with iron corrugated vertically, or to introduce strong iron ribs.

These expedients, though they would have increased the weight beyond that of the wooden ponton, might have been successful, but they were not attempted, as the boat failed in other respects. In fact, it would not bear transportation; as, in travelling over a rough road, the joints open, either the rivets or the sheet iron giving way. When in the bridge, if the boat grounds on an uneven or rocky bottom, a hole is frequently punched through it, and such injuries cannot be repaired in the field. The wooden ponton is not only much less liable to such accidents, but can be readily repaired when they do occur.

Previous to the battle of Gettysburg, a ponton bridge over the Potomac at Harper's Ferry was destroyed, the pontons being scuttled and set adrift above the rapids. About three weeks after, the water having fallen, the boats were recovered, repaired with pieces of hard-bread boxes obtained from the commissary, and used in constructing a bridge at Berlin, over which the entire army passed into Virginia.

With regard to the canvas boat, it soon became apparent that it is precisely what we require for our advance-guard train. It is light, simple, strong, easily repaired, and when packed can be safely transported with the superstructure of the bridge as rapidly as any column of troops can move. A strong argument in favor of its adoption was that it had been used successfully by the Russians for more than a hundred years, under every variety of circumstances likely to occur in this country.

The selection of the carriage for transporting the bridge material was next taken up. The French ponton-wagon is not adapted to our rough roads. The wheels are too small, and cannot be increased in diameter without raising the load too high above the ground.

A carriage was finally devised on the principle of the four-horse truck used in this city. By means of the horizontal fifth wheel over the front axle, and of an inclined wagon-bed, forward wheels of the requisite size were enabled to reverse completely under the load, thus allowing the carriage to turn in a short space. This construction is absolutely necessary when wagons so long-geared travel over a crooked road.

For the chess wagons and canvas train, a similar wagon would, without doubt, have answered the purpose perfectly, so far as transportation is concerned; but the ordinary baggage wagon of the Quartermaster's Department, with some modifications, was used on account of the facility with which it could be obtained, and the readiness with which spare parts could be procured for repairs in the field.

The Birago trestle, which had been recently adopted by most of the European nations, was also thoroughly tested; and the result proving favorable, it was proposed to employ it in connection with the pontons of both trains.

From the information gained by these experiments, there resulted the system of bridge equipage adopted at the commencement of the late war. During the winter of 1861-'62, five trains were constructed, each composed of thirty-four pontons and eight trestles, the pontons being nearly of the same form and dimensions as the French bateau. The frame was somewhat different, the ribs being entire and strongly ironed, and the ironing stronger throughout. The stern was provided with a locker. There were also other alterations in the details of construction. The balks were stronger; and the Birago trestle was modified by substituting built beams, instead of solid timber, for the trestle-caps and balks.

At the same time several canvas trains were organized. In constructing the ponton-frame, the dimensions and form of the Russian boat were exactly retained. The scantling for the frame was considerably lighter, but, being strongly braced and ironed, the strength was about the same. One train was composed of canvas boats and trestles; being, in truth, a trestle train, with auxiliary pontons to be used only where the depth of water, or muddy bottom, prevented the use of trestles.

In the month of February, 1862, a ponton bridge, composed of about sixty boats of the reserve train, was thrown across the Potomac at Harper's Ferry. The river was then a perfect torrent, the water being fifteen feet above the summer level, and filled with drift-wood and floating ice. The greatest difficulty was experienced in pulling the pontons into position, and it was necessary to make use of ship anchors and chain cables to hold them in place. Notwithstanding these unfavorable circumstances, the bridge was completed in about eight hours, and the corps commanded by General BANKS, with all its trains and artillery, passed over it without accident or delay.

Several of these trains accompanied the army in the Peninsular campaign. The pontons were used in discharging quartermaster and commissary stores at Ship Point; in disembarking General FRANKLIN'S command at West Point, and in constructing bridges over Hampton Creek, the streams in front of Yorktown and the Upper Chickahominy. Finally a bridge was built over the Lower Chickahominy, about two thousand feet long, over which nearly the whole army of the Potomac, with its immense trains, artillery and cavalry, passed with promptness and safety.

After the army had passed, the bridge was dismantled and the balks, chess, etc., passed into the pontons, which were formed into rafts, and towed by steamers to Washington. The bridge-trains were next transported to Harper's Ferry, where a bridge was constructed a second time, but under entirely different circumstances from that built during the previous winter. The water was now not deep enough; and as it continued to subside shortly after the bridge was laid, many of the pontons grounded on a very uneven and rocky bottom. Some of them were completely out of water, yet the heavy trains continued to move over the bridge without seriously injuring them; and when the water rose, most of them floated as well as ever.

Discovering in this way that the boats were much stronger than had been supposed, the engineers were enabled to improve the method of bridging tidal streams.

It had formerly been considered necessary to build out to low-water mark with trestles, so that the ponton should always be afloat. The bridge is now commenced at high-water mark, building with pontons alone. As the water subsides, the pontons nearest shore ground successively, forming a gentle ramp from the abutment to the floating portion of the bridge, instead of making the descent in twenty feet as formerly. This method, of course, applies only to wooden pontons, and to cases where the bottom is favorable.

During the Fredericksburg campaign, it became necessary to force the passage of the Rappahannock. The enemy having entrenched themselves on the bank, prevented for some time the construction of the bridge; until, at length, troops were embarked in the pontons and ferried across, where they stormed the rifle-pits, and held them until the bridge was completed.

During the year 1863, the ponton-trains accompanied the army in all its marches backward and forward through Virginia, frequently bridging the Potomac, Rapidan and Rappahannock. In the latter stream, the bridges remained in position all winter; and, notwithstanding the frequent floods and the quantity of ice formed, but few interruptions occurred upon these thoroughfares.

During the campaign of 1864, trains composed of fourteen pontons and two trestles accompanied each of the three army-corps of the army of the Potomac. These trains attended their corps in the long march from Culpepper to the James river; and although the roads were frequently very bad, in no instance did they delay the march of the troops, or arrive late when a bridge was to be laid.

The headquarters' train was followed by a canvas train, which, when a crossing was to be made by surprise, was sent forward with the cavalry, who covered the construction of the bridge and held the position until the main body arrived.

On reaching the James river, a bridge was laid opposite Charles City Court House, about two thousand feet in length. The water was so deep and rapid that the pontons could not be held by their own anchors, and it was found necessary to attach their cables to schooners anchored above and below the bridge.

Thus the wooden ponton-trains, through four years of war, during which the bridges constructed were without parallel in number and magnitude, amply fulfilled all the requisites of a good bridge-equipage. The frequent crossing of the Chickahominy, Potomac and James rivers proved that, even under the most unfavorable circumstances, it could furnish a bridge capable of passing a large army, with its heaviest trains, over wide and rapid streams, with safety and despatch. Its capabilities in ferrying troops were shown at Ship Point, West Point and Fredericksburg; and of the mobility of the equipage there was abundant proof in the long marches during the last two years of the war.

The canvas equipage, also, was perfectly successful as an advance-guard train. In the cavalry raids it was always able to keep pace with the columns; and, although they frequently marched hundreds of miles, it was invariably ready to furnish a prompt and secure means of crossing all the streams on their route. It also often furnished bridges for the heavy trains of the army over streams of moderate width and rapidity.

The only part of the bridge equipage which did not realize the expectations of the engineers, was the Birago trestle. As already remarked, a train was organized early in the war on the Austrian principle, in which the trestle is the main dependence, the ponton being merely auxiliary. It was supposed that many streams would be encountered which could be bridged best with trestles alone, but none such were met with. In fact, when a stream is more than two feet deep, a ponton-bridge may be laid; when less than that depth, if the bottom is hard, it may be forded, and no bridge is required. Should the bottom be soft, the trestle-legs will usually settle, so as to render the bridge unsafe. As it was not deemed advisable to transport with the army a train which could only be used in exceptional cases, this description of equipage was abandoned. The trestle was, however, very useful as an auxiliary, especially with the canvas train; for as these boats, when in the bridge, should never be allowed to touch the bottom, it is frequently necessary to build out several buoys from the shore before sufficient depth of water can be obtained to float the ponton; and for this purpose nothing could be better than the Birago trestle, which is also equally useful for a similar purpose with the reserve train, where the river bottom is rough near the shore.

The canvas train was extensively used by the Western army, and with such success that it was proposed to employ it exclusively. Experience, however, in the East has clearly proved that this train cannot fulfill all that is required of the bridge equipage of a large army. The bridges of the Potomac and James rivers could not have been built with canvas boats, which will not resist ice and drift-wood; neither are they suited to the disembarkation of troops or the passage of a river by force.

Experience would, therefore, lead us to concur with General BARNARD, in his remarks on this subject, namely:

"The numerous proposers of 'flying' bridges forget that, if a military bridge is intended to be *carried with* an army, it is also intended to *carry* an army, its columns of men, its cavalry, its countless heavy wagons, and its ponderous artillery. It must carry all these, and it must do it with certainty and safety, even though a demoralized corps should rush upon it in throngs.

"No make-shift expedients, no 'ingenious' invention not tested by severe experiments, no light affair, of which the chief merit alleged is that it is light, will be likely to do what is required, and what the French ponton has so often done."

The United States bridge equipage is, therefore, composed of two distinct trains—the reserve and the advance-guard trains. The former are intended to accompany large bodies of troops in the field, and are provided with the material for the construction of bridges of sufficient capacity to pass large armies, with their heaviest trains, over rivers of any size and capacity. For these, the French ponton is adapted.

The advance-guard train is intended for the use of light troops, such as advance guards, cavalry expeditions, etc. It is organized both as regards material and carriages, with a view to rapidity of movement. At the same time, it is capable of furnishing a bridge which will fulfill all the requirements of troops engaged on such service. For this train the canvas ponton is adapted.

The Board have made many improvements in the details of the trains, such as the wagons, tools, materials, etc., submitting every change to the test of actual practice at the Engineer School at Willett's Point. The system of instruction has been also made much more complete than it was heretofore, and it now comprehends all that is necessary for the service of the train, from the elementary drill of the individual pontonier up to the construction of the most elaborate bridge.

The system of instruction is not wholly confined to the construction and management of floating bridges. There is an admirable chapter on the passage of rivers, which contains many valuable expedients for performing this operation, when circumstances render the use of the ponton-bridge unnecessary or impracticable. There is also a section treating of expedients with insufficient trains; and, still more important, a complete chapter on the construction of bridges without the bridge equipage.

A ready and intelligent use of expedients is, perhaps, the most valuable quantity of mind that a military engineer can possess, and we may justly claim this quality for our people in a most remarkable degree. The record of our military engineers during the war is proof that they are not, like too many military men, bound down by routine, and helpless beyond it, and the presence of such suggestions and such instructions in a drill-book of the Regular army, is still further evidence to this fact.

Statistics Relative to Mining in Europe.

FROM A RECENT NUMBER OF "GLÜCKAUF."

THE number of furnaces in Europe is about 5,000, of which 1,086 are in Great Britain; 1,177 in Prussia; 926 in France; 481 in Belgium; 436 in Austria; 374 in Russia; 361 in Spain; 255 in Sweden and Norway; 193 in Saxony; 150 in Italy; and 136 in Bavaria.

Of iron, the yearly make is about 157,373,000 cwt., of which 91,630,000 is made in Great Britain; 23,560,000 in France; 10,521,000 in Prussia (old provinces); 8,790,000 in Belgium; 7,134,000 in Austria; 4,950,000 in Russia; 4,150,000 in Sweden and Norway; 1,600,000 in Italy; 824,000 in Spain; 718,000 in Bavaria; 617,000 in the province of Hanover; 451,000 in Saxony; 455,000 in Nassau; 263,000 in Netherlands; 206,000 in Wurtemberg; 169,000 in Brunswick; 155,000 in Cassel; 139,000 in Hesse; 120,000 in Portugal; 101,000 in Baden; 20,000 in Denmark; and 20,000 in Greece.

The worth of the total produce of iron in Europe amounts to about 966,000,000 francs, (it exceeds in worth all the remaining metals by nearly three times); of this amount, Great Britain makes 412,000,000 fr.; France, 197,000,000; Prussia, 80,000,000; Belgium, 80,000,000; Austria, 55,000,000; Sweden and Norway, 45,000,000; Russia, 41,000,000; Italy, 14,000,000; Spain, 8,000,000; Switzerland, 3,500,000; Netherlands, 200,000; and of the rest of Europe, about 3,500 000 francs.

By this valuation, the worth of 1 cwt. of iron in Sweden and Norway is 10 fr. 80 c.; Switzerland, 10 fr.; Spain, 9 fr. 70c.; Belgium, 9 fr.; Italy, 8 fr. 70c.; France, 8 fr. 50 c.; Russia, 8 fr.; Austria, 7 fr. 70c.; Prussia, 7 fr. 60c.; in Great Britain, 4 fr. 50c.

The coal and brown coal production of Europe amounts, at the present time, to 2,550,230,000 cwts., to be divided as follows: Great Britain, 1,632,000,000; Prussia, 350,230,000; France, 198,000,000; Belgium, 192,200,000; Austria, 91,500,000; Saxony, 40,440,000; Russia, 16,500,000; Spain, 6,750,000; Anhalt, 6,080,000; Bavaria, 5,300,000; Italy, 3,000,000; Brunswick, 2,420,000; Sweden and Norway, 2,400,000; Denmark, 1,200,000; Portugal, 1,000,000; Hesse, 700,000; Switzerland, 600,000; Netherlands, 500,000; Baden, 170,000; Wurtemburg, 100,000 cwts.

The worth of the coal and brown coal production of Europe runs up to 909,500,000 fr.; that of Great Britain, 115,000,000 fr.; France, 108,100,000; Prussia, 170,200,000; Belgium, 38,300,000; Austria, 30,700,000; Russia, 2,800,000; Spain, 900,000; Sweden and Norway, 1,300,000; Italy, 400,000; Portugal, 300,000; Denmark, 300,000; Switzerland and the Netherlands, 150,000 fr.

The yearly production of the whole of Europe in rock-salt amounts to 94,984,000 cwt., divided as follows:—Great Britain, 32,400,000 cwts.; France, 12,600,000; Russia, 8,380,000; Austria, 8,310,000; Spain, 7,880,000; Italy, 5,900,000; Portugal, 4,180,000; Prussia, 3,760,000; Rumania, 2,500,000; Turkey, 1,500,000; Bavaria, 1,010,000; Wurtemburg, 958,000; Switzerland, 530,000; Baden, 394,000; Greece, 310,000; Hesse, 256,000; Saxe-Meiningen, 140,000; Brunswick, 116,000; Anhalt, 114,000; Mecklenburg, 80,000; Schwarzburg, 68,000; Belgium, 60,000; Saxe-Weimar, 40,000; Netherlands; 40,000; Denmark, 30,000; Reus, 25,000; Lippe-Detmold, 24,000; Saxe-Coburg-Gotha, 8,000; Waldeck, 3,000.

Sweden, Saxony, Serbia, Montenegro, Monaco, Oldenburg, Hesse-Homburg, Lichtenstein, and the three free towns have no salt.

The total worth of the mining products of Europe runs up to 2,916,740,000 fr., divided according to the different minerals as follows:—Iron, 966,000,000 fr.; coal and brown coal, 909,-

500,000 ; salt, 577,300,000 ; copper, 103,000,000 ; lead, 122,-300,000 ; zinc, 60,200,000 ; silver, 54,400,000 ; sulphur, 47,-700,000 ; gold, 28,550,000 ; tin, 23,700,000 ; brass, 12,060,000 ; quicksilver, 6,150,000 ; alum, 2,310,000 ; nickel, 2,760,000 ; antimony, 680,000 ; and arsenic, 190,000 fr., and all the other mining products not quoted amount to about 5,000,000 fr.

The iron, the coal, and the salt thus form 85 per cent. of the whole mineral kingdom, whilst the two precious metals—gold and silver—make out only 2·6 per cent.

The average price of the quoted minerals for the whole of Europe is as follows :—Gold, per cwt., 185,800 fr. ; silver, 12,000 ; quicksilver, 359 ; nickel, 346 ; brass, 142 ; copper, 140 ; tin, 136 ; antimony, 29 ; zinc, 26 ; lead, 25 fr. 50c. ; arsenic 16 fr. 80c. ; alum, 11 fr. 50c. ; sulphur, 7 fr. 40c. ; iron, 6 fr. 40c. ; salt, 6 fr. 10c. ; coal, 40c. ; brown coal, 28c.

Hence, the intrinsic worth of gold is 464,000 times greater than the worth of coal, yet, nevertheless, the production's worth of coal surpasses that of gold thirty-three times.

The worth of the mining products is distributed over the several countries as follows :—Great Britain, 1,153,520,000 fr. ; France, 424,910,000 ; Prussia, 288,700,000 ; Austria, 219,230,-000 ; Belgium, 210,110,000 ; Russia, 164,600,000 ; Spain, 141,-300,000 ; Italy, 104,800,000 ; Sweden and Norway, 66,400,000 ; Portugal, 33,500,000 ; Turkey, 33,100,000 ; Saxony, 28,500,000 ; Bavaria, 17,400,000 ; Switzerland, 8,100,000 ; Wurtemburg, 5,700,000 ; Baden, 2,800,000 ; Greece, 2,600,000 ; Netherlands, 2,450,000 ; Hesse, 2,300,000 ; Brunswick, 2,300,000 ; Denmark, 550,000.

The gross number of miners in the whole of Europe amounts to 1,275,000 ; of which there are in Great Britain 363,000 ; France, 206,500 ; Prussia, 184,800 ; Austria, 125,900 ; Belgium. 111,500 ; Russia, 80,000 ; Spain, 73,600 ; Italy, 36,000 ; Sweden and Norway, 29,000 ; Saxony, 23,300 ; Bavaria, 11,200 ; Switzerland, 5,100 ; Portugal, 4,200 ; Wurtemburg, 2,200 ; Baden, 2,100 ; Greece, 800 ; Netherlands, 800 ; and Denmark, 300.

Reckoning the relatives of the miners and the furnace-men, the population which derives its living from mining amounts to 2,955,000 persons ; of these there are distributed in Great Britain 900,000 persons ; France, 503,000 ; Prussia, 523,000 ; Austria, 260,000 ; Belgium, 218,000 ; Russia, 180,000 ; Spain, 167,000 ; Italy, 75,000 ; Sweden and Norway, 75,000 ; Saxony, 56,000 ; Bavaria, 24,000 ; Portugal, 9,000 ; Switzerland, 10,-000 ; and the rest of Europe, 30,000 persons. The mining population of Europe, therefore, forms one per cent. of the whole.

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105,444.—WASHING-MACHINE.—Martin P. Flanders, Jay, N. Y.
105,445.—SWINGING STANCHION.—Walter C. Gifford, Jamestown, New York.
105,446.—PLOW.—Joseph S. Godfrey, Leslie, Mich., assignor to himself and Sears M. Loveridge, Pittsburgh, Pa.
105,447.—ELECTRO-MAGNETIC ALARM.—Thomas S. Hall, Stamford, assignor to Hall's Electric Railway-Switch and Drawbridge-Signal Company, New Haven, Conn.
105,448.—GRINDING-MILL.—Daniel Halladay, Batavia, Ill.
105,449.—ELEVATOR.—David D. Hanson, Weare, N. H.
105,450.—HYDRAULIC MOTOR.—James Harris, Boston, Mass.
105,451.—GRAIN AND SEED SEPARATOR.—Reason Hawkins, Sugar Creek, Ind.
105,452.—SHOEMAKERS' EDGE-PLANE.—Arthur P. Hazard, North Bridgewater, Mass.
105,453.—WASHING-MACHINE.—Benjamin Hockabout, Antioch, Cal.
105,454.—KNITTING-MACHINE.—Joseph Hollen, Fostoria, Pa.
105,455.—PRESS-DYEING.—John Holt, Lowell, Mass.
105,456.—PIPE-COUPLING—Richard Hoskin, Dutch Flat, Cal.
105,457.—CONDENSE FOR MARINE ENGINE.—John Houpt, Springtown, Pa.
105,458.—SOAP-CUTTING MACHINE.—Willis Humiston and Horace N. Humiston, Troy, N, Y.
105,459.—ALARM TICKET-NIPPERS FOR COUPON TICKETS.—Isaac Hyde, Oakland, Cal.
105,460.—CULTIVATOR.—Moses Johnson, Three Rivers, Mich.
105,461.—HIGH AND LOW-WATER ALARM.—George N. Jones, Chicago, Ill.
105,462.—PACKING.—Leopold Katzenstein, New York, N. Y.
105,463.—MACHINE FOR MAKING PRINTERS' LEADS.—Karl M. Klees, New York, N. Y.
105,464.—APPARATUS FOR THE MANUFACTURE OF ALBUMENIZED PAPER.—Jakob Klein, Hesse Darmstadt, North German Confederation, assignor to Dreyfoos, Klein & Co., New York, N. Y.
105,465.—PISTON FOR STEAM-PUMPS.—Lucius J. Knowles, Worcester, Mass.
105,466.—PISTON-PACKING.—Lucius J. Knowles, Worcester, Mass.
105,467.—HAIR-SPRING-TESTING APPARATUS FOR WATCHES.—John Logan, Boston, Mass.
105,468.—PARLOR-ROULETTE.—Alexis Marias, St. Louis, Mo,, assignor to himself and John O'Brien, same place.
105,469.—SAW FOR MAKING STUFFING FOR UPHOLSTERING.—George W. Marble, Charlestown, N. H., assignor to himself and Charles Way, same place.
105,470.—CAR-COUPLING.—Charles Markley, New York, N. Y.
105,471.—CHURN.—James Mayhew, West Tisbury, Mass.
105,472.—FOLDING-CHAIR.—George McAleer, Worcester, Mass.
105,473.—CORN PLASTER.—Joseph A. McClure, Mount Carroll, Ind.
105,474.—COMBINED KEY-RING AND DOOR FASTENER.—Bryant H. Melendy, Manchester, N. H.
105,475.—CHURN.—J. P. Merenda, Springfield, Ohio.
105,476.—WHEEL-FEED.—Joseph B. Merritt, Abington. Mass.
105,477.—HAY-ELEVATOR AND CONVEYOR.—Charles A. Miller, Marengo township, Mich.
105,478, patentented in England, May 18, 1868.—RAILWAY CAR-SPRING.—Joseph Mitchell, Sheffield, assignor to William Edward Newton, London, England.
105,479.—MAKING BUTTER.—Adolphe Mot, Washington, D. C.
105,480.—ORE-SEPARATOR.—David Nevin, Georgetown, Colorado Territory.
105,481.—STRAW-CUTTER.—Harrison Ogborn, Richmond, Ind.
105,482.—SHOE-FASTENER.—Julius E. Otto, Elmore, Ohio.
105,483.—CLOTHES-LINE CLAMP.—Thomas W. Owens, Granville, Ohio.
105,484.—PRESERVING VARIOUS ARTICLES OF FOOD.—Henry L. Palmer, Stillwater, N. Y.
105,485.—PRESERVING VEGETABLE EXTRACTS.—Henry L. Palmer, Stillwater, N. Y.
105,486.—PATTERNS FOR MEASURING THE BODY OF GARMENTS.—Moses Palmer, Jr., Boston, Mass., and E. Willoughby Anderson, Washington, D. C.
105,487.—MACHINE FOR MILLING THE KNUCKLES OF BUTT-HINGES.—Emery Parker, New Britain, Conn,, assignor to Russell & Erwin Manufacturing Company, same place.
105,488.—MACHINE FOR CENTERING BUTTS.—Emery Parker, New Britain, Conn., assignor to Russell & Erwin Manufacturing Company, same place.
105,489.—DOOR-BOLT.—Russell B. Prindle, Norwich, N. Y.
105,490.—MACHINE FOR MAKING HORSE-SHOE BLANKS.—Abraam Reese, and Jacob Reese, Pittsburgh, Pa.
105,491.—BUFFER-HEADS FOR CAR-COUPLINGS.—W. Rickards, Jr., Franklin, Pa.
105,492.—MARINE-COMPASS.—Ed. S. Ritchie, Brookline, Mass.
105,493.—ELECTRO-MAGNETIC GATE AND SIGNAL APPARATUS FOR RAILROADS—Wm. Robinson, Brooklyn, N. Y.
105,494.—antedated July 8, 1870.—ELECTRO-MAGNETIC GATE-OPERATING APPARATUS.—Wm. Robinson, Brooklyn, N. Y.
105,495.—OYSTER-TONGS.—Joseph W. Sands, Annapolis, Md.
105,496.—HANGING MILL-STONES.—Charles Schnieder, Gallon, Ohio.
105,497.—BRIDGE.—James Seebold, Kantz, Pa.
105,498.—MACHINE FOR SPLITTING WHALEBONE.—Jas. A. Seavy, Boston, Mass.
105,499.—MANUFACTURE OF LUBRICATING COMPOUNDS.—Edwin B. S. Shoemaker, Towsontown, Md.
105,500.—WASHING-MACHINE.—Peter B. Shoemaker, Plattsburgh, Mo.
105,501.—BOOT AND SHOE-STIFFENER.—Nathan J. Simonds, Woburn, Mass.
105,502.—CONCRETE PAVEMENT.—Robert Skinner and Bonnet Bonnet, San Francisco, Cal.
105,503.—GUAGE-COCK.—Levi F. Smith Philadelphia, Pa.
105,504.—RAILWAY-RAIL CHAIR.—Samuel H. Smith, Altoona, Pa.
105,505.—FOLDING CARRIAGE FOR CHILDREN.—Thomas G. Stagg, East New York, N. Y.
105,506, antedated March 23, 1870.—MACHINE FOR REMOVING GREASE FROM LEATHER.—James Starrett, Salem Mass., assignor, by mesne assignments, to Handly Starratt and Benjamin McKeen.
105,507.—VISE.—Anson P. Stephens, Brooklyn, N. Y.
105,508.—APPARATUS FOR OPERATING WINDOW-CURTAINS.—John Stephens and Jairus Collins, Fairview, Ohio.
105,509.—TRACE-BUCKLE.—Chas. H. Stevens, Fayetteville, N. Y.
105,510.—CARLE-STOPPER.—James Stitt, San Francisco, Cal.
105,511.—PREPARATION OF CEMENT FOR THE MANUFACTURE OF CEMENT PIPE.—John W. Stockwell, Portland, Me.
105,512.—SECRETARY-SAFE.—Timothy J. Sullivan, Albany, N. Y.
105,513.—DEVICE FOR INSERTING THE PINTLE OR PINS IN BUTT-HINGES.—Lucius P. Summers, New Britain, Conn., assignor to P. & F. Corbin, same place.
105,514.—CONDIMENT OR RELISH.—William Francis Swasey, San Francisco, Cal.
105,515.—CONSTRUCTION OF CHAIRS.—Daniel E. Teal, New Lisbon, N. Y.
105,516.—CONSTRUCTION OF CHAIRS.—Daniel E. Teal, New Lisbon, N. Y.
105,517.—CONSTRUCTION OF CHAIRS.—Daniel E. Teal, New Lisbon, N. Y.
105,518.—GUAGE-PINS FOR TYMPAN-SHEETS.—R. W. Thing, Boston, Mass , assignor to himself and David T. Pray, same place.
105,519.—DEVICE FOR CURLING HAIR.—S. Lee Tibbals, Dutch Flat, Cal.
105,520.—CENTRIFUGAL SUGAR-DRAINING AND MOLDING-MACHINE. San Francisco, Cal.
105,521.—ICE-CREAM REFRIGERATOR.—Carl Vignal, New York, N. Y.
105,522.—PLATFORM-SCALES.—Victor Vincent, New York, N. Y.
105,523.—SAD-IRON HOLDER.—E. H. Gustav Von Doehren and Frederick L. Reimers, Davenport, Iowa.
105,524.—CAR-SPRING.—Richard Rose, New York, N. Y.
105,525.—REGULATOR FOR STEAM HEATING APPARATUS.—Alfred Walker, Portland, Me.
105,526.—MODE OF PROTECTING FRUIT TREES FROM CURCULIO, &c. Rebecca J. Walker, Goshen, Ohio.
105,527.—QUARTZ-MILL.—Thomas Walker, Philadelphia, Pa.
105,528.—GANG-PLOW.—Elisha W. Walton, San Leandro, Cal.
105,529.—WEED-CUTTER.—Elisha W. Walton, San Leandro, Cal.
105,530.—CORN-POPPER AND COFFEE-ROASTER.—L. A. Warner, Freeport, Ill.
105,531.—PLOW.—George Wharton, Jerseyville, Ill.
105,532.—WATER-WHEEL.—Henry J. White, Chatham, Iowa.
105,533.—OSCILLATING CHURN.—Nimrod E. Wilson, Wilsonburg, West Va.
105,534.—LIFTING-JACK.—George W. Windsor, Allegheny City, Pa., assignor to himself and John F. Beilstein, same place.
105,535, antedated July 12. 1870.—BASE-BURNING STOVE.—George A. Wing, Albany, N. Y.
105,536.—WATER-WHEEL.—Charles D. Wright, Leesville, Conn.
105,537.—KNITTING-MACHINE.—Wm. H. Abel, Bennington, Vt.
105,538.—KNITTING-MACHING.—William H. Abel, Lowell, Mass., assignor to himself, Robert H. Brown and John E. Crane.
105,539.—KNITTING-MACHINE.—William H. Abel, Lowell, Mass., assignor to himself, Robert H. Brown, and John E. Crane.
105,540.—SHINGLE-MACHINE.—James E. Austin, Oswego, N. Y.
105,541.—OVEN.—Hosea Ball, New York, N. Y.
105,542.—HORSE HAY-RAKE.—Newcomb M. Barnes, Tiffin, Ohio.
105,543.—MACHINE FOR SHARPENING SAWS.—John Atkinson Borthwick, Philadelphia, Pa.
105,544.—WINKER FOR HARNESS-BRIDLES.—William Boyd, Mansfield, Mass.
105,545.—COFFEE-MILL.—Thomas W. Brown, Boston, Mass., assignor to Charles Parker, Meriden, Conn.
105,546.—CARRIAGE-WHEEL.—Seneca B. Buck, Elyria, Ohio.
105,547.—FRUIT AND ALCOHOL STILL.—James A. Campbell, Rockingham county, Va., assignor to himself, John W. Ribble, and P. Phares.
105,548.—SEWING-MACHINE AND ITS SUPPORTING-TABLE.—Milton Chase, Haverhill, assignor to himself and Horace Chase, Boston, Mass.
105,549.—VALVE FOR WATER-BOILERS.—Edward H. Clarkson, Alexandria, Va., assignor to himself and James H. Robinson.
105,550.—HARVESTER-CUTTER.—James M. Connel, Newark, Ohio.
105,551.—SUBSOIL-PLOW.—Thomas L. Cotten, Madison County, Miss., assignor to Martha J. Cotten, same place.
105,552.—SYSTEM OF FIRE-ALARM AND POLICE-TELEGRAPH.—Sylvanus D. Cushman, New Lisbon, assignor to the Automatic Fire-Alarm Company, Leetona, Ohio.
105,553.—KETTLE FOR MELTING, MINING, AND CASTING METALS.—William S. Deeds, Baltimore, Md., assignor to himself, John H. Baer, and George Koch, same place.
105,554.—SHIPS' TOPMAST.—Eben Denton, Braintree, Mass.
105,555.—BLACKSMITH'S TONGS.—Andrew J. Dexter, North Foster, R. I.
105,556.—WARDROBE BEDSTEAD.—Jas. F. Dodge, Nashua, N. H.
105,557, antedated July 6, 1870.—APPARATUS FOR GENERATING AND BURNING GASES IN METTALLURGIC FURNACES.—Josiah W. Ells, Pittsburgh, Pa., assignor to himself and S. M. Kier, same place.
105,558, antedated July 6. 1870.—GAS AND AIR-HEATING APPARATUS FOR METTALLURGIC FURNACES.—Josiah W. Ells, Pittsburgh, Pa., assignor to himself and S. M. Kier, same place.
105,559.—STOOL-STAND AND SHOW-CASE.—Eben B. Fenton and Henry S. Penfield, Chicago, Ill.
105,560, antedated July 8, 1870.—PRESERVING AND BEAUTIFYING CRYSTALLIZED SALTS UPON GLASS, MICA, &c.—Oscar S. Follet, New York, N. Y.
105,561.—GAS APPARATUS FOR RAILROADS, &c.—William Foster, Jr . New York, N. Y., and George P. Ganster, Reading. Pa.
105,562.—ELECTRO-MAGNETIC ATTACHMENT TO SHIPS' COMPASS.—Alfred Foucuat, Orleans, France.
105,563.—BLOTTING-PAD.—John F. French, Boston, Mass.
105,564.—HAND-TRUCK. — Leonard Gilson, Boston, Mass., assignor to himself and E. Stone Goodwin, same place.
105,565.—BARREL.—Pardon H. Griswold, Grand Rapids, Mich.
105,566.—COMBINED HORSE-SHOE AND BOOT.—Henry G. Haedrich and Henry Haedrich, Philadelphia, Pa.
105.567.—ROAD-SCRAPER.—Robert Hamilton, Franklin, Ind.
105,568.—BOLT-THREADING MACHINE.—Mahlon Hamlin, Catawissa, assignor to himself and Benjamin G. Welch, Danville, Pa.
105,569.—BOLT-THREAEING MACHINE.—Mahlon Hamlin, Catawissa, assignor to himself and Benjamin G. Welch, Danville, Pa.
105,570.—SHOVEL-TEETH FOR CULTIVATORS.—Thomas Harding, Lafayette, Ind.
105,571.—ORGAN STOPS.—Albert K. Hebbard, Boston, Mass.
105,572.—FRUIT-CAN.—Gustav E. Heinig, Louisville, Ky.
105,573, antedated July 9. 1870.—SHADE-CORD FASTENER.—Enos T. Higham, Philadelphia, Pa., assignor to himself and Daniel Higham, same place.
105,574.—WHIP-SOCKET RING.—John J. Hillman, Boston, Mass.
105,575.—COMBINED CORN-PLOW AND GRAIN-DRILL.—Caswell Hollar, Abingdon, Ind.
105,576, antedated July 8, 1870.—PROTECTING AND BEAUTIFYING CRYSTALLIZED METALLIC SURFACES.—Henry M. Johnston, New York, N. Y.
105,577.—BINDING AND HEMMING ATTACHMENT FOR SEWING-MACHINES.—Amasa C. Kassen, Milwaukee, Wis.
105,578.—CORN-PLANTER.—Isaac A. Keeler, Middleville, Mich.
105,579.—ANIMAL POKE.—William Kelly, Saranac, Mich.
105,580.—HORSE-COLLAR.—Lester B. Kenney, Charlotte, Mich.
105,581.—AMMONIACAL GAS ENGINE.—Emile Lamm, New Orleans, La.
105,582.—HOOK.—Robert Vance Laney, Cumberland, Md.
105,583.—CAN-OPENER.—Wm. W. Lyman, West Meriden, Conn.
105,584.—COFFEE OR TEA-POT.—Edward B. Manning, Middletown, Conn., assignor to Manning, Bowman & Co., same place.
105,585.—PROCESS AND APPARATUS FOR THE MANUFACTURE OF PAPER.—George E. Marshal, Laurel, Ind.
105,586.—MACHINE FOR PACKING SALT.—John McGrew, West Columbia, West Va.
105,587.—BASE-BURNING STOVE.—Julius Herman Meissner, Pittsburgh, Pa.
105,588.—VISE.—George Mitchell, Trenton, N. J.
105,589.—VAPOR-BURNER.—Thomas Moore, Bloomington, Ill.
105,590.—TREATING OIL-WELLS TO REMOVE OBSTRUCTIONS TO THE FLOW OF OIL.—Butler G. Noble, Brooklyn, N. Y.
105,591.—CHECK-VALVE.—Louis E. O'Brien, Latrobe, Pa.
105,592.—GRINDING-MILL.—Geo. O'Connor and Haines O'Connor, Mishawaka, Ind.
105,593.—RAILWAY-RAIL CLEANER.—Carlos Ortiz and Hilario Valladares, Matanzas, Cuba.
105,594.—MANUFACTURE OF PAPER.—Henry Pemberton, Allegheny City, Pa.
105,595.—DIES FOR TRIMMING AND STRAIGHTENING AXLE-CLIPS.—Ebenezer H. Plant, Plantsville, Conn.
105,596.—PAINT FOR MARBLEIZING WOOD.—Francis G. Pokorny, New York, N. Y.
105,597.—HARVESTER.—Amos Rank, Salem, Ohio.
105,598.—LOCOMOTIVE WHEEL.—John R. Richardson, Max Meadows, Va.
105,599.—CONCRETE-PAVEMENT. — John J. Schillinger, New York, N. Y
105,600.—GANG-PLOW.—Delos A. Sears, Rockford, Ill.
105,601,—PRUNING-HOOK.—D. B. Seeley, Sterling, Ill.

105,602.—WATER WHEEL.—W. L. Selleck, Beetown, assignor to American Mortising Machine Company, Boston, Mass.
105,603.—MORTISING-MACHINE.—Henry C. Smith, Lawrence, Kansas, assignor to American Mortising Machine Company, Boston, Mass.
105,604.—WRENCH.—Othniel J. Smith, Wauwatosa, Wis.
105,605.—POWER-PRESS.—Charles M. Stratton and Oscar G. Stratton, Greenfield, Mass.
105,606.—BUNG-CUTTER.—Nicholas J. Templeton, Cincinnati, Ohio.
105,607.—EARTH-CHAMBER PAIL.—Henry Terry, Waterbury, Conn.
105,608.—HARVESTER-RAKE.—James Toay, Mineral Point, Wis.
105,609.—APPARATUS FOR COOLING AND REFRIGERATING.—P. H. Vander Weyde, New York, N. Y.
105,610.—MILLSTONE-CURB.—Alexander Van Vleck and Thomas Phillips, Jordan, N. Y.
105,611.—COMBINED HORSE HAY-RAKE AND TEDDER.—Henry C. Varnum, Hartford, Vt assignor to himself and James E. Larkin.
105,612.—HARVESTER.—Henry C. Velie, Poughkeepsie, N. Y.
105,613.—BUNG.—Albin Warth, Stapleton, N. Y.
105,614.—CLAMP-NUT FOR SCREWS.—Robert White, Rockville Centre, N. Y. assignor to himself and Joseph J. Walton, Newark, N. Y.
105,615.—WEATHER STRIP FOR DOORS.—Franklin Whatmore and Edward Conkling, Channahon, Ill.
105,616.—WASHING-MACHINE.—George L. Witsil, Philadelphia, Pa., assignor to himself and Thomas L. Bates, same place.
105,617.—FURNACE FOR STEAM-ENGINES.—George M. Wyne and William MacGrove, Dennison, Ohio.
105,618.—FLOUR-BOLT ATTACHMENT.—Obert Turner, Rochester, N. Y. assignor to Turner & Lutes, same place.

REISSUES.

4,074.—MANUFACTURE OF WHITE-LEAD.—Daniel C. Colby, Washington, D. C., and Thomas Woods, and Benjamin F. Pine, Philadelphia, Pa., assignees of Henry S. Hannan.—Patent No. 80,168, dated July 21, 1868.
4,075.—Division 1.—PRIMING CARTRIDGE.—Arthur Moffatt, Washington, D. C.—Patent No. 53,168, dated March 13, 1866.
4,076.—Division 2.—PRIMING CARTRIDGE.—Arthur Moffattt, Washington, D. C.—Patent No 53,168, dated March 13, 1868.
4,077.—MODE OF ATTACHING CORNICE TO WINDOWS.—Anthony Pepio, East Billerica, Mass.—Patent No. 101,158, dated March 22, 1870.

DESIGNS.

4,225.—JELLY-CUP.—James S. Atterbury and Thomas B. Atterbury, Pittsburgh, Pa.
4,226.—STOVE-DOOR AND PANEL.—Micajah Currier Burleigh, Great Falls, N. H.
4,227.—HANDLE OF SPOONS AND OTHER ARTICLES.—Augustus Conradt, Philadelphia, Pa.
4,228.—NET-FABRIC.—Robert J. Jefford, New York, N. Y. assignor to Abraham G. Jennings, same place.
4,229.—NET-FABRIC.—Abraham G. Jennings, New York, N. Y.
4,230.—KNITTED FABRIC.—Martin Landenberger, Philadel., Pa.
4,231.—KNITTED GOODS.—Martin Landenberger, Philadel., Pa.
4,232.—KNITTED GOODS.—Martin, Landenberger, Philadel., Pa.
4,233.—SHAWL.—Martin Landenberger, Philadel., Pa.
4,234.—SHAWL.—Martin Landenberger, Philadel., Pa.
4,235.—SHAWL.—Martin Landenberger, Philadel., Pa.
4,236.—STOVE.—Isaac T. Montross, Peekskill, N. Y.
4,237.—CLOCK-CASE.—Nicholas Müller, New York, N. Y.
4,238.—MATCH-SAFE.—Albert P. Seymour, Hecla Works, N. Y.
4,239.—STOVE.—George T. Spicer, Charles H. Peckham, and William A. Spicer, Providence, R. I.
4,240.—STOVE-PLATE.—Nicholas S. Vedder, Troy, and Tobias S. Heister, Lansingburg, N. Y., assignors to Nicholas S. Vedder.
4,241.—STOVE-PLATE.—Nicholas S. Vedder, Troy, and Tobias S. Heister, Lansingburg, N. Y., assignors to Nicholas S. Vedder.
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4,245.—STOVE-PLATE.—Nicholas S. Vedder, Troy, and Tobias S. Heister, Lansingburg, N. Y., assignors to Nicholas S. Vedder.
4,246.—STOVE-PLATE.—Nicholas S. Vedder, and Francis Ritchie, Troy, and Tobias S. Heister, Lansingburg, N. Y., assignors to Nicholas S. Vedder.
4,247.—TEA OR COFFEE-POT.—Horace C. Wilcox, West Meriden, Conn., assignor to the Meriden Brittannia Company, same place.
4,248.—PICTURE-FRAME.—John H. Bellamy, Charlestown, Mass.
4,249.—HAND-GLASS FRAME.—John H. Bellamy, Charlestown, Mass.
4,250.—BRACKET.—John H. Bellamy, Charlestown, Mass.
2,251.—STOCKING FABRIC.—Conyers Button, Philadelphia, Pa.
4,252.—CARPET-PATTERN.—Hugh Christie, Morrisania, N. Y., assignor to Israel Foster, Philadelphia, Pa.
4,253.—CARPET-PATTERN.—Jonathan Crabtree, Philadelphia, Pa., assignor to John Gay, same place.
4,254.—MUFF.—John H. Kappelhoff and Samuel Rauh, New York, N. Y.
4,255.—SAW.—Edward Rhodes, Philadelphia, Pa., assignor to Henry Disston & Son, same place.
4,256.—BRACELET.—Frederick Wessel, New Britain, Conn.

EXTENSIONS.

SAMUEL B. FAY, of New York, N. Y.—No. 15,266, dated July 1, 1856.—Metallic Hook for Labels.
ERASMUS FRENCH, of New Haven, and CHARLES FROST, of Waterbury, Conn.—No. 15,228, dated July 1, 1856.—Improved Method of Making Boxes.
WM. MONT STORM, New York, N. Y.—No. 15,307, dated July 8, 1856; reissued January 1, 1867, No. 2,445.—Improvement in Breach-loading Fire-Arms
WM. MONT STORM, New York, N. Y.—No. 15,307, dated July 8, 1856; reissued January 1, 1867, No. 2,446.—Improvement in Breach Loading Fire Arms.
SADY D. BOYES, of Philadelphia, Pa., administratrix of the estate of BURRIT C. BOYES.—No. 15,402, dated July 22, 1856.—Improvement in Folding-Guides for Sewing Machine.
ALEXANDER C. TWINING, of Hudson, Ohio.—No. 10,221, dated November 8, 1853; patennted in England, July 3, 1850; extended June 21, 1864; again extended by Act of Congress; approved July 7, 1870.—Improvement in the Process and Apparatus for Making Ice.

Wrecking and Fire Steamer "John Fuller."

LAST Thursday, we had the pleasure of witnessing a trial of the steam-pumps and fire apparatus on board the above-named steamer. At about eleven o'clock the vessel left the foot of Wall street, with a party of invited guests on board, consisting of the President of the Fire Commissioners, Mr. HITCHMAN, General SHALER, Commissioner HENNESSEY, Commissioner GALWAY, and Commissioner JOHN J. BLAIR, Captain STANDART, Mr. HODGES, Mr. A. F. KINGMAN, Mr. SHAW, Captain LUCE, together with Messrs. JOHN C. BAXTER & SON, the owners of the "John Fuller," and others.

The trip to City Island, where the trial of the pumps was made, was one of the most delightful that we remember. After enjoying the East river as only an editor escaped from Park Row can, we gave, by invitation of Captain JOSEPH PECK, some attention to the boat and her engines. She is driven by a 16-by-20 inch vertical self-acting engine. The propeller is seven feet in diameter. From what we saw at the beginning of the trip, we judge that the boat can be run up to eight or ten knots per hour. She was built in Philadelphia in 1864, and registers 61 tons. She was rebuilt in 1869 in New York. Just forward of the engine are two large steam-pumps, which form the chief part of the fire apparatus. These pumps are sixteen inches in diameter, and the steam pistons twenty-three inches, with about two feet stroke. This gives them an enormous power, as their work fully shows. The coal-bunkers are capable of holding twenty tons of coal, and the fresh water tanks a supply sufficient for three days' consumption in the boiler. The boiler is more than sufficient to supply the pumps, and the propelling engine at the same time. It is jacketed with a new composition, which the chief engineer of the boat, Mr. CHARLES BAHLER, pronounces the best he has seen, and, so far as we could judge, is a very fine thing, retaining the heat perfectly, and making a very neat clothing.

When the boat was first built, there was only one pump. In 1869 it was decided to put in two when the boat was rebuilt. These were designed and constructed by Mr. CHAS. B. HARDICK, of the well-known Niagara Steam Pump-works, of Brooklyn, New York. On board, we hardly get a clear idea of the immense size and power of these engines till we stand beside the discharge-pipe, and note the cap to which eight four-inch lines of hose can be attached, and see the huge copper air-chamber, twenty-four inches in diameter and eight feet high. The vacuum-chamber is as long, but only six inches in diameter. The discharge-pipe, which is only used when pumping out a vessel, is about two feet in diameter. When the pumps are working through it, they are capable of taking out 8,000 gallons of water per minute.

During the great drouth last summer this boat was employed at Philadelphia in supplying the city with water, while the turbines did not work. During this time, which was about twenty days, she threw from 3,000,000 to 4,000,000 gallons of water into reservoirs, 134 feet above low water mark, every 24 hours, through a pipe 12 inches in diameter, with a consumption of 15 tons of coal every 24 hours. On one day, under very favorable circumstances, 5,000,000 gallons were raised in a day, but this was exceptional. During these twenty days this steamer supplied all the water that was used in one section of the city, which would otherwise have been entirely dependent upon the steam fire engines. Though for a time one of the latter was used for pumping water, it was found that the work was too severe for them.

A few weeks since we had an opportunity to witness the working of the boat in actual service, at a fire in Jersey City. As we approached the fire we were surprised at the great size and force of one of the streams. It seemed nearly double the size of any of the streams from the steam fire engines. Following up the line of hose we came, after some minutes, to the John Fuller. Only one pump was going, and that at a very slow speed. The water was forced through some eight hundred feet of hose. It was a very fair test, we thought, of the power and value of the boat, and would have been to any looker-on.

It was somewhat after noon when we reached City Island. Then followed the trial of the pumps. Eight streams of water, from 1½ inch nozzles, were thrown to a distance that was amazing. As they were thrown on the water we had no way of measuring them. The next was to show what the pumps could do at wrecking, and a simple discharge pipe conducted the water over the side. This pipe was some two feet in diameter, and the pumps kept it full and running at about 8,000 gallons per minute. When the pumps are running the exhaust can be turned into the chimney, so that the draught is intense. During the trial the furnace seemed at a white heat.

A collation was spread by Messrs. BAXTER, which was enjoyed by the invited guests on the return trip.

Carbolic Acid.

CARBOLIC ACID is prepared by treating what was called the light oils (*benzines*) from the distillation of coal with dilute alkalis and carefully distilling the products which are heavier than water, the alkali being previously neutralized by muriatic acid. It is seldom found pure, it having more or less of cresylic acid in it, and often other closely related bodies. Carbolic acid is a solid at ordinary temperature, melting at 106° Fahrenheit and soluble in twenty parts of water; is a powerful anticeptic and disenfectant, preventing putrefaction and fermentation. Its whole effect is due on its arresting change. It is simply a preservative. As an anticeptic, it prevents change in the materials. As a disinfectant, it accomplishes the result by the same means—that is, kills the spores, if malaria consists of such, or arrests chemical change if malaria is a putrescing material. Carbolic acid is a powerful poison. Every one has known that creosote is poisonous, and carbolic acid is only a new name for an old, well known material, only less crude. Creosote will do all that is claimed for carbolic acid.

It is an active poison, acting directly on the nervous system, and may cause death; indeed, death has ensued from its application to an aching tooth. In the Glasgow Royal Infirmary the records show that when dressings in amputations and compound fractures contained no carbolic acid, one case in four and a quarter died; with carbolic acid in the dressings, one in three died, showing that the use of carbolic acid was positively injurious. It coagulates the vital fluids of the body and of course stops vital action. In the hands of skillful physicians carbolic acid is susceptible of important uses; but for family use it is no more appropriate than arsenic or corrosive sublimate.

Its application, when not very much diluted, produces effects very similar to that of burns, blistering the skin and producing a sore that can be cured by the treatment that would cure a burn. It is offered the public in all forms, as soaps, washes, salve, and also as a medicine for various diseases, empirics taking advantage of its popularity to render it available for their profit. That it is for many purposes very useful is not to be denied, but it is very evident that it should be used with caution and care. We have used these carbolic acids and soaps upon our own hands and face, and carbolic acid for disinfecting purposes, and recommend it. Our article is not designed to deter any one from its use as a disinfecting agent, but to give people who use it the knowledge of its properties they ought to possess.—*Prof. Darby, in. Am. Grocer.*

IMPORTANT TO INVENTORS.

WESTERN AND CO.'S PATENT AGENCY.

CHARLES ROGERS, Solicitor and Manager.

In connection with the publication of the ENGINEERING and MINING JOURNAL and the MANUFACTURER AND BUILDER, we have frequently received applications from subscribers and patrons to act as their agents in transacting business with the United States Patent Office; and in view of the increasing number and urgency of such requests, we have resolved to add this department to our business. We have accordingly organized

A COMPLETE PATENT AGENCY,

and now offer our services in procuring patents in this and foreign countries, and transacting all business relating to the obtaining of patents.

Being possessed of superior facilities, in connection with our associate attorneys in Washington and foreign countries, for the successful prosecution of this business, we do not hesitate to guarantee satisfaction to all who may entrust their business to our care.

We have engaged as solicitor and manager Mr. CHARLES ROGERS, a well-known expert in this department. Being a practical mechanic, and having been an examiner in the Patent Office at Washington for a number of years, besides enjoying an experience of more than twenty years as a solicitor of patents, Mr. ROGERS is intimately acquainted with all the details of the business, both in and out of the office.

The specifications, drawings, etc., prepared in our office, will be found to compare favorably with those prepared by any other establishment, while the intimate acquaintance of our manager with the routine of business in the Patent Office, gives us a decided advantage in managing difficult cases.

We are fully prepared to prosecute Rejected Cases and Cases in Interference and Infringements, and also to procure Reissues and Extensions of Patents.

We can also furnish Models for use in the Patent Office, to parties who may desire it, as we have made arrangements for this purpose with one of the most skilful machinists in this country, who possesses every facility for getting up models in the most perfect manner, at short notice, and on reasonable terms.

We shall give special attention to the prosecution of Rejected Applications, which have been improperly prepared by the inventor or incompetent attorneys.

We shall be ready at all times to furnish all necessary information and advice to intending applicants, and give our opinion as to the patentability of their inventions, free of charge; and we make it a rule never to take charge of a case unless we see a reasonable probability of obtaining a patent without first giving the inventor our candid opinion as to the probable result of the application.

OUR CHARGES.

Our charges are as moderate as those of any other responsible patent attorneys, as will be seen from the following figures: For preparing a case (whether simple or complicated) and attending to its passage through the Patent Office, our fee is from $30 to $40, which includes all the necessary papers and drawings. If the application is rejected we make no further charge, but prepare all necessary amendments, and, if requisite, appeal to the Board of Examiners-in-Chief. Most Patent Attorneys make an additional charge on each adverse action of the Patent Office, but we have found it more satisfactory to all parties interested to make our full charge at first; and as we expect no contingent fees, it is to our interest to prepare our cases properly at the commencement, thus avoiding annoyance to ourselves and delay in getting out the patent.

The cost of getting out a patent through our agency is—

For first Government fee, stamp, etc	$16
" our fee	$30 to 40
" final Government fee	20
Total	$66 to $76

If the case has to be appealed, the applicant pays the Government fee on appeal, $10; but we shall ordinarily make no additional charge for our services. The first two items are payable when the application is sent in, and the second Government fee when a patent has been allowed. Before an appeal is taken, in any case, the applicant will be fully advised of all facts and charges, and no proceedings had without his sanction; so that all inventors who employ our agency will know in advance what their applications and patents are to cost.

For Rejected Applications prepared by others, our charges vary somewhat according to the nature of the case, but are generally as follows:

In advance, on receiving the case	$10
When the patent is allowed	$20 to 30
Total	$30 to $40

the applicant paying such Government fees as may be required.

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Our fee is	$15
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For attending to the obtaining of Releases, Extensions, etc., and preparing Assignments, our charges vary according to the labor involved.

We are possesed of all the facilities for the successful prosecution of applications for patents in Great Britain, France, Belgium, and other foreign countries, on favorable terms.

Inventors who reside out of New York, and wish to procure a patent, need not go to the expense of visiting this city or Washington, but may send us a model of their invention, or a sketch and brief description; this will enable us to decide as to its probable novelty and patentability, and we can proceed at once to prosecute the case. We shall, however, be glad at all times to see our friends from any section, and give them such information as we are possessed of relating to patents, free of charge. A Post-office order for $16, to pay the first Government fee and stamp duty, should be sent along with the model; our fee $30 to $40, being payable as soon as the application is ready to be sent to Washington.

Patents granted through this agency will be described and illustrated in the columns of the ENGINEERING AND MINING JOURNAL or the MANUFACTURER AND BUILDER, without further charge to the inventor than the cost of the necessary cuts.

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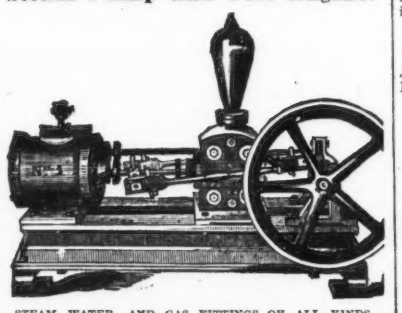

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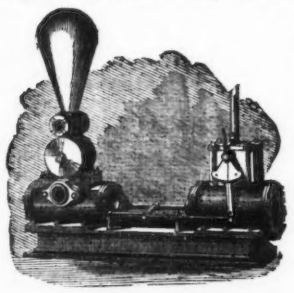

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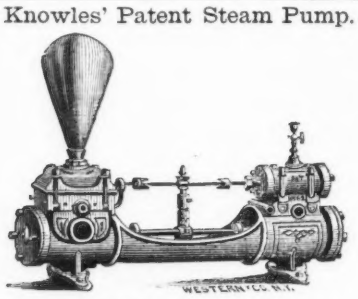

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Air Pumps, Blowing Engines, Hydraulic Pressure Pumps, New Locomotive Pumps, Fire Pumps, Boiler, Feed, Marine, Drainage, Sugar-work, Brewery, Distillery, Oil and Wrecking Pumps.
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(Working with Plungers, and especially arranged for pumping water containing dirty or gritty matter.)
Pumps for every possible duty, and all fully guaranteed. Also,
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HAND PUMP AND
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COMBINED.

These pumps are the cheapest first-class pumps in the market.
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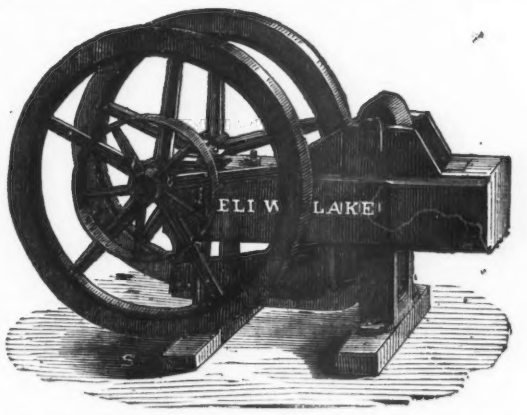

The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.
This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.
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May 24:1y

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OXIDE OF ZINC, SPELTER, SHEET ZINC.
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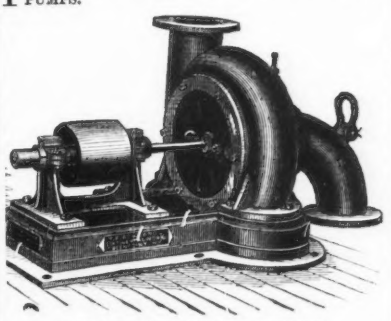

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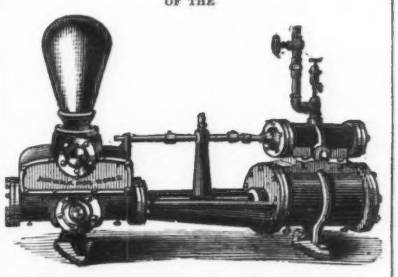

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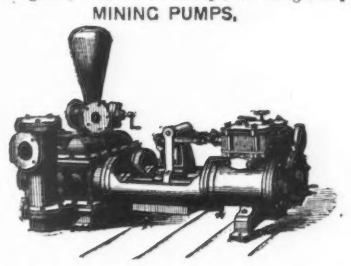

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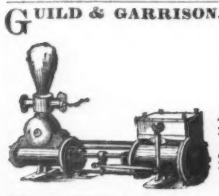

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TONS SCRANTON COAL,
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The sale will be positive; each lot put up will be sold to the highest bidder; no bids, in any form whatever, being made for account of, or on behalf of the Company. The conditions will be fully made known at the time of sale.
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The Coal from their mines is remarkably free from sulphur, and will be carefully mined and carefully shipped, free of slate and other impurities. This Coal has an illuminating power of 19 candles, yielding over 10,000 cubic feet of Gas to the ton, and an excellent Coke.
Refer to the Manhattan Gas Light Co., of New York, and the New York Gas Light Co., of New York.
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Air, why it is propelled down, into and around the workings
" Quantity of, produced by the furnace.
" Friction of
" The great friction of produced by one mode of ventilation, and how reduced by another
" Pure added to impure (plans.
" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
" Dividing of, but not into "separate and and distinct" current (plans)
" Crossings (see H on plans)
" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
" Expansion of
" Its velocity and force
" Rush of, into each division
" Quantity produced by natural ventilation
" Splitting, why it should be adopted
" Splitting, why the workmen object to Mr. Hopton adopting the mode
Anemometer, measurement of air by, engraving of
Area of a pit, how to find
Barometers, Showing the time of an outlet of gas in mines (engraving)
Bricks, how to find the number in the walling of a shaft.
Buddle's plan
Circumference of a pit, how to find
Coal, several ways of working it out, and why man methods of working it out are adopted
" Working out in banks (plans)
" Working it out in following up banks (plan)
" Working out in pillars (plans)
" Working out in long wall (plans)
" Working out in drifts (plans)
" Working out with no regularity (plan)
" Working out by the "end way" or in endings (plan)
Cubical Contents of a pit, how to find
Dialing, the mode of
Dials, several engravings
" How constructed
" How fixed in mine surveying
" Needle, its variations
Diameter of shaft
Dip of mine, how to find and lay on (plan)
Explosion, the power of an
" " At Lund-hill, in what part of the mine it was supposed to take place (plan)
" How the power may be diminished
Furnace, how to find the horse-power of
" The place of fixing, to produce the largest ventilating current
" Engravings of ground floor, front and back view
" Remarks upon
Gases, (carbonic acid) composition of
" Do. properties of
" (After, or choke damp) composition of
" (Carburetted hydrogen) do.
" Choke damp and carbonic acid, not one and the same in quality
" The effect produced on people by inhaling such
" The quantity required for an explosive mixture
" The elasticity of
" The weight of
" The nature and quality of
" Why some mines generate and produce more than others
" Why some mines generate a mixture of
Goaf, or gob, how tramrods are made through (plan
Lund-hill (plan)
Managers, who are best competent to manage mines
Miscellaneous questions
Natural ventilation
Planning, how workings are laid on the plan
Regulations (see R on plans)
Safety Lamps, why flame will not penetrate through, engraving of
Sections on mechanical ventilation
Summary of accidents
Surveying, how mines are with the dial
Surveying, how mines are with the theodolite
Tables of weights and measures
Temperature on surface
Temperature in mines
Temperature, difference of between down and up-cast
Theodolites for mine surveying
Theodolites, how constructed
Theodolites, the magnetic needle dispensed with, and how workings are laid on plan, with Theodolite surveying
Theodolites, how mines are surveyed with them
Up-cast larger than down-cast (plan)
Ventilating mines by mechanical power
Ventilation, several ways of
Weather, how a change of affects the workings
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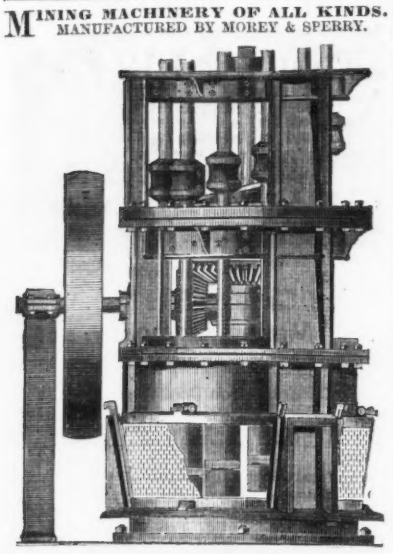

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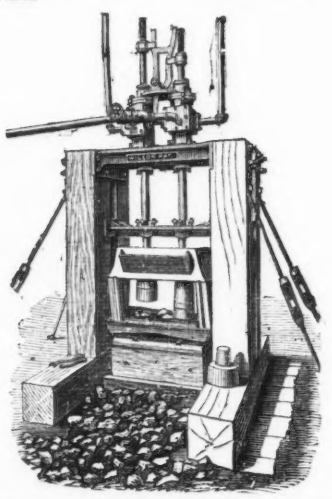

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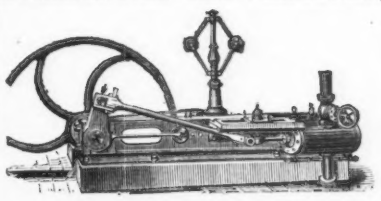

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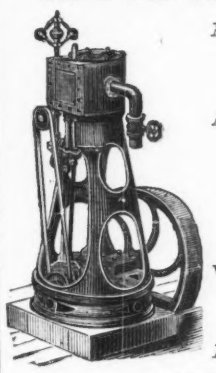

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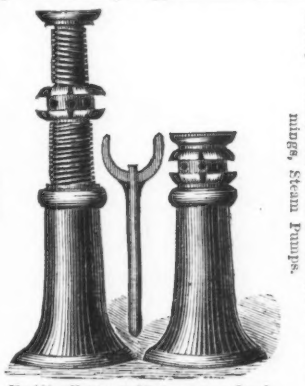

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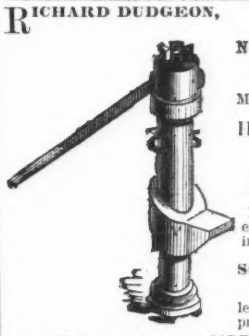

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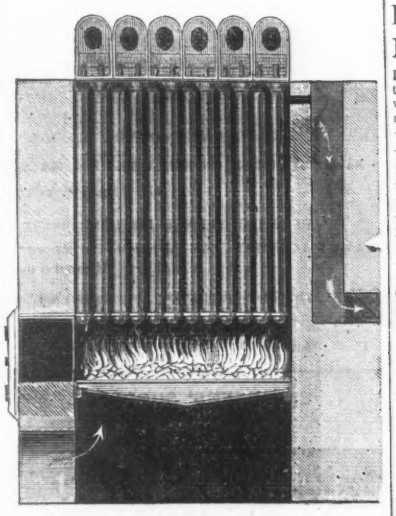

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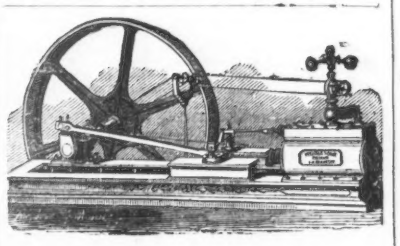

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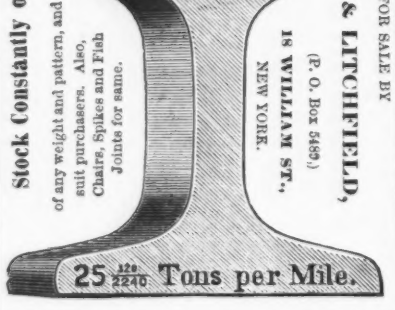

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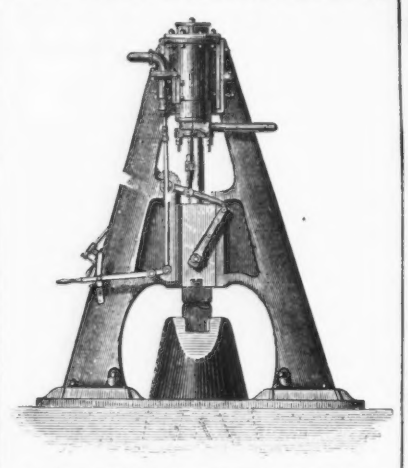

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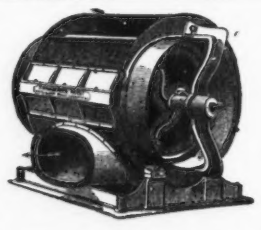

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